

Logic and Critical Thinking

Study Book

Chapter 2



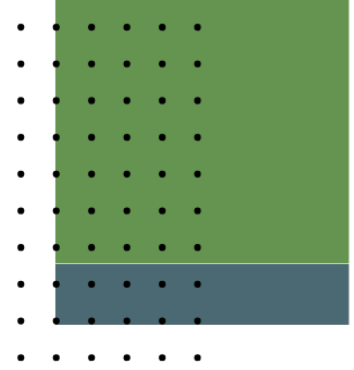
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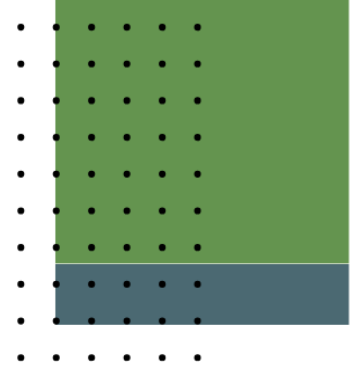
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LOGIC AND CRITICAL THINKING

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Lesson 1: Basic Concepts of Logic: Arguments, Premises and Conclusions

What is the Meaning of Logic?

- the word logic comes from Greek word **logos**, which means sentence, discourse, reason, truth and rule
- Logic is:
 - the science, which evaluates arguments and the study of correct reasoning
 - the study of methods and principles of correct reasoning or the art of correct reasoning
 - a science that helps to develop the method and principles that we may use as a criterion for evaluating the arguments of others and as a guide to construct good arguments of our own
 - Logic is the attempt to codify the rules of rational thought
 - ✦ Logicians explore the structure of arguments that preserve truth or allow the optimal extraction of knowledge from evidence
 - Logic is one of the primary tools philosophers use in their inquiries
 - ✦ The precision of logic helps them to cope with the subtlety of philosophical problems and the often misleading nature of conversational language
- In logic, as an academic discipline, we study reasoning itself: forms of argument, general principles and particular errors, along with methods of arguing

What is the Benefit of Studying Logic?

“Logic sharpens and refines our natural gifts to think, reason and argue.” (C. S. Layman)

- We use logic in our day-to-day communications
 - As human beings, we all think, reason and argue; and we all are subject to the reasoning of other people
- the study of logic is one of the best ways to refine one’s natural ability to think, reason and argue
- the following are some of the major benefits that we can gain from the study of logic:
 - It helps us to develop the skill needed to construct sound (good) and fallacy-free arguments of one’s own and to evaluate the arguments of others
 - It provides a fundamental defense against the prejudiced and uncivilized attitudes that threaten the foundation of a civilized and democratic society
 - It helps us to distinguish good arguments from bad arguments; understand and identify the common logical errors in reasoning
 - It helps us to understand and identify the common confusions that often happen due to misuse of language

- It enables us to disclose ill-conceived policies in the political sphere, to be careful of disguises, and to distinguish the rational from irrational and the sane from the insane and so on
- In fact, one of the goals of logic is to produce individuals who are critical, rational and reasonable both in the sphere of public and private life

What is an Argument?

- **Argument** is a technical term and the chief concern of logic
 - from logical point of view, it is a group of statements, one or more of which (the premise) are claimed to provide support for, or reason to believe, one of the other, the (conclusion)

Features of argument definition:

1. an argument is a group of statements

- the first requirement for a passage to be qualified as an argument is to combine two or more statements
- ◆ **Statement:** a declarative sentence that has a truth-value of either true or false

Example:

- Dr. Abiy Ahmed the current Prime Minister of Ethiopia
- Mekelle is the capital city of Tigray Region
- Ethiopia was colonized by Germany

- ✦ Statement (a) and (b) are true, because they describe things as they are, or assert what really is the case. Hence, "Truth" is their truth-value
- ✦ Whereas statement (c) is false because it asserts what is not, and "Falsity" its truth-value

- Logicians used proposition and statement interchangeably
 - However, in strict (technical) sense, **proposition** is the meaning or information content of a statement. In book, the term statement is used to refer premises and a conclusion
- there are sentences that are not statements
 - **Question:** Would you close the window?
 - **Proposal:** Let us study together
 - **Exclamation:** Right on!
 - **Suggestion:** I suggest that you read philosophy texts
 - **Command:** Give me your ID Card, Now!
 - ✦ none of the above sentences can be either true or false. Hence, none of them can be classified as statement. As a result, none of them can make up an argument

2. the statements that make up an argument are divided into premise(s) and conclusion

- the mere fact that a passage contains two or more statements cannot guarantee the existence of an argument
- an argument is a group statement, which contains **at least one premise** and **one and only one conclusion**
 - an argument may contain more than one premise but only one conclusion
- Argument always attempts to justify a claim
 - the statement or statements that supposedly justify the claim is/are known as the premises of the argument
 - ✦ **Premise:** a statement that set forth the reason or evidence, which is given for accepting the conclusion of an argument. It is claimed evidence
 - The claim that the statement attempts to justify is known as a conclusion of an argument
 - the conclusion is the claim that an argument is trying to establish
 - ✦ **Conclusion:** a statement, which is claimed to follow from the given evidence (premise)
- All arguments may be placed in one of two basic groups
 - **Good (well-supported) arguments:** the premises really do support the conclusion
 - **bad (poorly-supported) arguments:** the premises do not support the conclusion

Example:

a) All Ethiopians are Africans. (Premise 1)

b) Tsionawit is Ethiopian. (Premise2)

c) Therefore, Tsionawit is African. (Conclusion)

- the first two statements are premises, because they are claimed to provide evidence for the third statement
- whereas the third statement is a conclusion because it is claimed to follow from the given evidences
- The claim that the premises support the conclusion, (and/or that the conclusion follow from the premises), is **indicated by** the word “therefore”
- the premises really do support the conclusion, they give good reason for believing that the conclusion is true, and therefore, the argument is a good one

Example:

a) Some Africans are black. (Premise-1)

b) Zelalem is an African. (Premise-2)

c) Therefore, Zelalem is black. (Conclusion)

- the premises fail to support the conclusion adequately. Even if they may be true, **they do not provide good reason** to believe that the conclusion is true. Therefore, it is bad argument

How can we distinguish premises from conclusion and vice versa?

- Premises and conclusions are difficult to identify for a number of reasons, **sometimes arguments may contain other sentences as elements**

Techniques that can help us to identify premises from a conclusion and vice versa:

1. looking at an indicator word

- indicator words that provide clues in identifying premises and conclusion
- **Conclusion Indicators:**
 - Therefore | Wherefore | Accordingly | Provided that | It must be that
 - We may conclude | Entails that | Hence | It shows that | Whence | So
 - Thus | Consequently | We may infer | It implies that | As a result | It follows that
- In argument that contains any of the conclusion indicator words, **the statement that follows the indicator word can usually be identified as the conclusion**
- By the process of elimination, the other statements in the argument can be identified as premises, but **only based on their logical importance to the identified conclusion**

Example:

- a) Women are mammals
- b) Zenebech is a woman
- c) Therefore, Zenebech is a mammal

- Based on the above rule, the conclusion of this argument is “Zenebech is a mammal” because **it follows the conclusion indicator word “therefore”**, and the other two statements are premises

- **Premise Indicators:**
 - Since | As indicated by | Because | Owing to
 - Seeing that | Given that | As | For
 - In that | May be inferred from | Inasmuch as | For the reason that
- In argument that contains any of the premise indicator words, a **statement that follows the indicator word can usually be identified as a premise**
- By same the process of elimination, the other remaining single statement will be a conclusion

Example:

You should avoid any form of cheating on exams because cheating on exams is punishable by the Senate Legislation of the University

- Based on the above rule, the premise of this argument is “cheating on exams is punishable by the Senate Legislation of the University” because it follows the premise indicator word “because”
- premise indicator “for this reason” is special in that it comes immediately after the premise it indicates and before the conclusion
 - this indicator can be both premise and conclusion indicator
 - The statement that comes before “for this reason” is the premise of an argument and the statement that comes after “for this reason” is the conclusion
- Sometimes a single indicator can be used to identify more than one premise

Example:

Tsionawit is a faithful wife, for Ethiopian women are faithful wives and Tsionawit an Ethiopian

- The premise indicator “for” goes with both “Ethiopian women are faithful wives” and “Tsionawit is an Ethiopian” These are the premises
- By process of elimination, “Tsionawit is a faithful wife” is the conclusion
- Sometimes you may an argument that contains no indicator all: neither a conclusion indicator word nor a premise indicator word
 - When this occurs, the reader/ listener must ask himself or herself such questions as:
 - ✦ What single statement is claimed (implicitly) to follow from the others?
 - ✦ What is the arguer trying to prove?
 - ✦ What is the main point in the passage?
 - The answers to these questions should point to the conclusion

Example:

Our country should increase the quality and quantity of its military. Ethnic conflicts are recently intensified; boarder conflicts are escalating; international terrorist activities are increasing

- The main point of this argument is to show that the country should increase the size and quality of its military. All the rest are given in support of the conclusion
- The following is the standard form of this argument:
 - ✓ Ethnic conflicts are recently intensified. (P-1)
 - ✓ Boarder conflicts are escalating. (P-2)
 - ✓ International terrorist activities are increasing. (P-3)
 - ✓ Thus, the country should increase the quality and quantity of its military. (C)
- Passages that contain arguments sometimes contain statements that are neither premises nor conclusion

- Only statements that are actually intended to support the conclusion should be included in the list of premises

Example:

Socialized medicine is not recommended because it would result in a reduction in the overall quality of medical care available to the average citizen. In addition, it might very well bankrupt the federal treasury. This is the whole case against socialized medicine in a nutshell

- The last statement makes only a **passing comment** about the argument itself and is therefore neither a premise nor a conclusion
- **Inference:** In the narrower sense it means the reasoning process expressed by the argument; broadly it refers the argument itself
- In this book, we use the narrower sense of the term inference or inferential link between the premises and the conclusion of arguments

Key Points on Lesson 1

Basic Concepts of Logic: Arguments, Premises and Conclusions

- the word logic comes from Greek word **logos**, which means sentence, discourse, reason, truth and rule
- Logic is:
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 - Logic is one of the primary tools philosophers use in their inquiries
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- major benefits that we can gain from the study of logic:
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 - provides a fundamental defense against the prejudiced and uncivilized attitudes
 - to distinguish good arguments from bad arguments
 - to identify the common confusions that often happen due to misuse of language
 - It enables us to disclose ill-conceived policies in the political sphere
- one of the goals of logic is to produce individuals who are critical, rational and reasonable both in the sphere of public and private life
- **Argument** is a group of statements, one or more of which (the premise) are claimed to provide support for, or reason to believe, one of the other, the (conclusion)

Features of argument definition:

1. an argument is a group of statements

- the first requirement for a passage to be qualified as an argument is to combine two or more statements
 - **Statement**: a declarative sentence that has a truth-value of either true or false
- Logicians used proposition and statement interchangeably, However in strict (technical) sense, **proposition** is the meaning or information content of a statement
- These sentences are not statements; none of them can be classified as statement; none of them can make up an argument:
 - **Question**: Would you close the window?
 - **Proposal**: Let us study together
 - **Exclamation**: Right on!
 - **Suggestion**: I suggest that you read philosophy texts
 - **Command**: Give me your ID Card, Now!

2. the statements that make up an argument are divided into premise(s) and conclusion

- the mere fact that a passage contains two or more statements cannot guarantee the existence of an argument
- an argument is a group statement, which contains **at least** one premise and **one and only one** conclusion
- Argument always attempts to justify a claim
 - the statement or statements that **supposedly justify the claim** is/are known as the premises of the argument
 - ✦ **Premise**: a statement that **set forth the reason or evidence**, which is given for accepting the conclusion of an argument. **It is claimed evidence**
 - **The claim that the statement attempts to justify** is known as a conclusion of an argument
 - ✦ **Conclusion**: a statement, which is **claimed to follow from the given evidence** (premise)
- All arguments may be placed in one of two basic groups
 - **Good (well-supported) arguments**: premises really do support the conclusion
 - **bad (poorly-supported) arguments**: premises do not support the conclusion

Techniques that can help us to identify premises from a conclusion and vice versa:

1. looking at an indicator word

- **Conclusion Indicators**:
 - Therefore | Wherefore | Accordingly | Provided that | It must be that
 - We may conclude | Entails that | Hence | It shows that | Whence | So
 - Thus | Consequently | We may infer | It implies that | As a result | It follows that
 - ✦ The statement that follows the indicator word can usually be identified as the conclusion
 - ✦ By the process of elimination, the other statements in the argument can be identified as premises, but only based on their logical importance
- **Premise Indicators**:
 - Since | As indicated by | Because | Owing to
 - Seeing that | Given that | As | For
 - In that | May be inferred from | Inasmuch as | For the reason that
 - ✦ The statement that follows the indicator word can usually be identified as a premise
 - ✦ By same the process of elimination, the other remaining single statement will be a conclusion

- premise indicator **“for this reason”** is special in that it comes immediately after the premise it indicates and before the conclusion
 - this indicator can be both premise and conclusion indicator
 - The statement that comes **before** “for this reason” is the **premise** of an argument and the statement that comes **after** “for this reason” is the **conclusion**
- Sometimes a single indicator can be used to identify more than one premise
- Sometimes you may find an argument that contains no indicator at all
 - When this occurs, you must ask yourself such questions as:
 - ✦ What single statement is claimed (implicitly) to follow from the others?
 - ✦ What is the arguer trying to prove?
 - ✦ What is the main point in the passage?
 - The **answers to these questions** should **point to the conclusion**
- Passages that contain arguments sometimes contain statements that are neither premises nor conclusion
 - Only statements that are actually intended to support the conclusion should be included in the list of premises
- **Inference:** In the narrower sense it means the reasoning process expressed by the argument; **broadly** it refers **the argument itself**
 - In this book, we use the narrower sense of the term inference or inferential link between the premises and the conclusion of arguments



University Exams

Lesson 1: Basic Concepts of Logic

Instruction: True/False

1. "For this reason" is a special indicator that came immediately after premise and before conclusion in argumentative passage

✓ Answer: True

≡ Explanation: The indicator word "For this reason" is different from others because it comes immediately after the premise it indicates and before the conclusion.

Moreover, this indicator can be both premise and conclusion indicator

📖 Module Reference: One premise indicator not included in the above list is “for this reason.” This indicator is special in that it comes immediately after the premise it indicates and before the conclusion – Module Page 11 Line 11

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Instruction: Multiple Choice

2. A statement that is incorrect about an argument among the following is:

- A. It is necessary for an argument to have one conclusion and more than one premises
- B. There must be a claim supported or implied by evidence for a passage to contain an argument
- C. A conclusion of an argument may appear either at the beginning or middle or at the end part of the passage
- D. At least one of the statements must provide evidence to support or prove a claim
- E. Evidence is a kind of reason, and the attempt to provide evidence in support of a conclusion is normally called an argument
- F. Both “A” and “C”

✓ Answer: A

≡ Explanation: It is not necessary for premises to be more than one for an argument. There can be one or more than one premises

📖 Module Reference:

- ✓ an argument is a group statement, which contains at least one premise and one and only one conclusion - Module Page 43 Line 14
- ✓ an argument may contain more than one premise but only one conclusion - Module Page 43 Line 15
- ✓ Two conditions must be fulfilled for a passage to purport to prove something ... There must be a claim that the alleged evidence or reasons supports or implies something - that is, a claim that something follows from the alleged evidence

3. Which of the following sentences is **not** a statement?

- A. The word 'because' is not a premise indicator
- B. If an inductive argument has a false premise, then we know it is uncogent
- C. Either you called me last night or somebody else did
- D. None of the above

✓ Answer: D

≡ Explanation: A statement is a sentence that can be either true or false. All of the sentences in the options are statements, because they can be evaluated as either true or false. Therefore, none of them is not a statement

📖 Module Reference: A statement is a declarative sentence that has a truth-value of either true or false – Module Page 42 Line 15

4. While distinguishing premise and conclusion of argument raising questions like; what a single statement claimed to follow from others? Or what is the central point of the argument? will help us to identify all except _____

- A. The existence of reasoning process
- B. Conclusion of argument
- C. Passing comment
- D. Inferential claim

✓ Answer: C

≡ Explanation:

- ✓ A passing comment is a remark that is not directly related to the main point of the argument, but rather expresses the speaker's opinion, attitude, or preference. A passing comment is not part of the reasoning process
- ✓ The existence of reasoning process, the conclusion of argument, and the inferential claim are all essential components of an argument

📖 **Module Reference:** If a statement has nothing to do with the conclusion or, for example, simply makes a passing comment, it should not be included within the context of the argument – Module Page 47 Line 23



Practice Questions

Lesson 1: Basic Concepts of Logic

Instruction: Identify the premises and conclusion of each argument

1. Titanium combines readily with oxygen, nitrogen, and hydrogen, all of which have an adverse effect on its mechanical properties. As a result, titanium must be processed in their absence.

✓ Answer:

- ✓ **Premise:** Titanium combines readily with oxygen, nitrogen, and hydrogen, all of which have an adverse effect on its mechanical properties.
- ✓ **Conclusion:** Titanium must be processed in their absence

2. When individuals voluntarily abandon property, they forfeit any expectation of privacy in it that they might have had. Therefore, a warrantless search or seizure of abandoned property is not unreasonable under the Fourth Amendment

✓ Answer:

- ✓ **Premise:** When individuals voluntarily abandon property, they forfeit any expectation of privacy in it that they might have had.
- ✓ **Conclusion:** A warrantless search and seizure of abandoned property is not unreasonable under the Fourth Amendment.

3. It really does matter if you get enough sleep. We need sleep to think clearly, react quickly, and create memories. Studies show that people who are taught mentally challenging tasks do better after a good night's sleep. Other research suggests that sleep is needed for creative problem solving.

✓ Answer:

- ✓ **Premise 1:** We need sleep to think clearly, react quickly, and create memories.
- ✓ **Premise 2:** Studies show that people who are taught mentally challenging tasks do better after a good night's sleep.
- ✓ **Premise 3:** Other research suggests that sleep is needed for creative problem solving.
- ✓ **Conclusion:** It really does matter if you get enough sleep.

4. Punishment, when speedy and specific, may suppress undesirable behavior, but it cannot teach or encourage desirable alternatives. Therefore, it is crucial to use positive

techniques to model and reinforce appropriate behavior that the person can use in place of the unacceptable response that has to be suppressed.

✓ Answer:

- ✓ **Premise 1:** Punishment, when speedy and specific, may suppress undesirable behavior
- ✓ **Premise 2:** Punishment cannot teach or encourage desirable alternatives.
- ✓ **Conclusion:** It is crucial to use positive techniques to model and reinforce appropriate behavior that the person can use in place of the unacceptable response that has to be suppressed.

Lesson 2: Techniques of Recognizing Arguments

- An **argument** is a systematic combination of one or more than one statements, which are **claimed to provide a logical support or evidence** (i.e., **premise(s)**) to another single **statement** which is **claimed to follow logically from the alleged evidence** (i.e., **conclusion**)
 - However, **not all passages that contain two or more statements are argumentative**
 - **Argumentative arguments** are distinguished from such kind of passages by their **primary goal: proving something**

2.1 Recognizing Argumentative Passages

- a passage contains an **argument** if it **purports to prove something**; if it does not do so, it does not contain an argument
- Two conditions must be fulfilled for a passage to purport to prove something:
 - **At least one of the statements must claim to present evidence or reasons**
 - ✦ the statements that claim to present the evidence or reasons are the **premises**
 - ✦ This condition refers to **premises** as it **tries to provide or claim to provide reasons or evidences for the conclusion**
 - ✦ **This condition expresses a factual claim**, and deciding whether it is fulfilled often falls outside the domain of logic
 - **There must be a claim that the alleged evidence or reasons supports or implies something - that is, a claim that something follows from the alleged evidence**
 - ✦ the statement that the evidence is claimed to support or imply is the **conclusion**
 - ✦ This condition refers to a **conclusion**
 - ✦ This condition expresses what is called an **inferential claim**
- It is **not necessary** that the premises present actual evidence or true reasons **nor** that the **premises actually do support the conclusion**
 - **But at least the premises must claim to present evidence or reasons, and there must be a claim that the evidence or reasons support or imply something**
- In evaluating arguments, therefore, most of our attention will be concentrated on whether the second condition is fulfilled because it is not necessary, at least at this level, that the premises present actual evidence or true reasons nor that do the premises actually support the conclusion

Inferential claim

- It is **the claim that the passage expresses a certain kind of reasoning process** - that **something supports or implies something** or that **something follows from something**

- this claim is not equitable with the intentions of the arguer
 - Intentions are subjective and, as such, are usually not accessible to the evaluator
- Rather, the **inferential claim is an objective feature of an argument** grounded in its language or structure
- An inferential claim can be either **explicit** or **implicit**

◆ **Explicit inferential claim:** usually asserted by premise or conclusion indicator words “thus” , “since” , “because” , “hence” , “therefore” and so on

- It exists if there is an **indicator word** that asserts an **explicit relationship** between the premises and the conclusions

Example:

Gamachuu is my biological father, because my mother told so.

- the premise indicator word “because” expresses the claim that evidence supports something, or that evidence is provided to prove something. Hence, the passage is an argument

◆ **Implicit inferential claim:**

- exists if **there is an inferential relationship** between the statements in a passage, **but the passage contains no indicator words**

Example:

The genetic modification of food is risky business. Genetic engineering can introduce unintended changes into the DNA of the food-producing organism, and these changes can be toxic to the consumer.

- ✦ The inferential relationship between the first statement and the other two constitutes an implicit claim that evidence supports something, so we are justified in calling the passage an argument though it does not contain indicator word
- ✦ The first statement is the conclusion, and the other two are the premises
- Sometimes it is difficult to identify whether a passage contain an argument, In deciding whether there is a claim that evidence supports or implies something **keep an eye out for**
 - **indicator words**, and
 - the **presence of an inferential claim** between the statements

Note

1. The mere occurrence of an indicator word by no means guarantees the presence of an argument

- make sure that the **existing indicator word is used to indicate a premise or a conclusion**

Example:

- ✓ Since Edison invented the phonograph, there have been many technological developments.
 - ✦ the word “since” is used in a temporal sense. It means “from the time that.” Thus, the passage is not an argument
- ✓ Since Edison invented the phonograph, he deserves credit for a major technological development
 - ✦ In this passage “since” is used in a logical sense, and so the passage is an argument

2. It is not always easy to detect the occurrences of an inferential relationship between statements in a passage, and the reader may have to review a passage several times before making a decision

- in deciding whether a passage contains an argument **one should try to insert mentally some indicators words among the statements to see whether there is a flow of ideas among the statements**
- To assist in distinguishing passages that contain arguments from those that do not, it is important to identify passages, which do not contain arguments: Non-argumentative passages

2.2 Recognizing Non-argumentative Passages

- Non-argumentative passages are **passages, which lack an inferential claim**
- These **include simple non-inferential passages, expository passages, illustrations, explanations, and conditional statements**
- Passages that lack an inferential claim may be statements, which could be premises, conclusion, or both
 - **What is missed is a claim that a reasoning process is being made**
 - for a passage **to be an argument, it not only should contain premises and a conclusion but also an inferential claim or a reasoning process**

Some of the most important forms of non-argumentative passages

1. Simple Non-inferential Passages

- Simple non-inferential passages are **unproblematic passages that lack a claim that anything is being proved**
- Such passages **contain statements that could be premises or conclusions (or both),**
 - **But what is missing is a claim that any potential premise supports a conclusion or that any potential conclusion is supported by premises**
- Passages of this sort include
 - ✓ **Warnings**

- ✓ pieces of advice
- ✓ statements of belief or opinion
- ✓ loosely associated statements
- ✓ reports

A. Warning

- a form of expression that is intended to **put someone on guard against a dangerous or detrimental situation**

Example:

Whatever you promise to tell, never confide political secrets to your wife

- **no evidence is given to prove that the statement is true**; and if no evidence is given to prove that the statement is true, then there is no argument

B. Piece of advice

- form of expression that makes a **recommendation** about some future decision or course of conduct

Example:

After class hours, I would suggest that you give careful consideration to the subject matter you have discussed

- there is **no evidence that is intended to prove anything in piece of advices**, and hence there is no argument in the above passage

C. Statement of belief or opinion

- An expression about **what someone** happens to **believe or think** about something

Example:

We believe that our university must develop and produce outstanding students who will perform with great skill and fulfill the demands of our nation

- **does not make any claim that the belief or opinion is supported by evidence**, or that it supports some conclusion, and hence does not contain an argument

D. Loosely associated statements

- May be about the same general subject, but **they lack a claim that one of them is proved by the others**

Example:

Not to honor men of worth will keep the people from contention; not to value goods that are hard to come by will keep them from theft; not to display what is desirable will keep them from being unsettled of mind

- There is **no claim that any of these statements provides evidence or reasons for believing another**, there is no argument

E. Report

- Consists of a group of statements that convey information about some topic or event

Example:

The great renaissance dam of Ethiopia has opened an employment opportunity for thousands of Ethiopians. In its completion, thirteen thousand Ethiopians are expected to be hired

- These statements could serve as the premises of an argument, but because the author makes no claim that they support or imply anything, there is no argument

Note

- be careful with reports about arguments

Example:

“The Air Force faces a serious shortage of experienced pilots in the years ahead, because repeated overseas tours and the allure of high paying jobs with commercial airlines are winning out over lucrative bonuses to stay in the service,” says a prominent Air Force official.

- This passage is not an argument, because the author of the passage does not claim that anything is supported by evidence. Rather, the author reports the claim by the Air Force official that something is supported by evidence
- If such passages are interpreted as “containing” arguments, it must be made clear that the argument is not the author’s but one made by someone about whom the author is reporting

2. Expository Passages

- A kind of discourse that begins with a topic sentence followed by one or more sentences that develop the topic sentence
- If the objective is not to prove the topic sentence but only to expand it or elaborate it, then there is no argument

Example:

There is a stylized relation of artist to mass audience in the sports, especially in baseball. Each player develops a style of his own-the swagger as he steps to the plate, the unique windup a pitcher has, the clean-swinging and hard-driving hits, the precision quickness and grace of infield and outfield, the sense of surplus power behind whatever is done

- the topic sentence is stated first, and the remaining sentences merely develop and flesh out this topic sentence
- This passage is not argument, because it lacks an inferential claim

Note

- However, **expository passages differ from simple non-inferential passages** (such as warnings and pieces of advice) in that **many of them can also be taken as arguments**
- If the purpose of the subsequent sentences in the passage is **not only to flesh out the topic sentence but also to prove it**, then **the passage is an argument**

Example:

Skin and the mucous membrane lining the respiratory and digestive tracts serve as mechanical barriers to entry by microbes. Oil gland secretions contain chemicals that weaken or kill bacteria on skin. The respiratory tract is lined by cells that sweep mucus and trapped particles up into the throat, where they can be swallowed. The stomach has an acidic pH, which inhibits the growth of many types of bacteria

- the topic sentence is stated first, and the **purpose of the remaining sentences is not only to show how the skin and mucous membranes serve as barriers to microbes but also to prove that they do this**
- Thus, **the passage can be taken as both an expository passage and an argument**
- In **borderline cases**, In deciding whether an expository passage should be interpreted as an argument, **ask yourself whether the topic sentence makes a claim that everyone accepts or agrees with**
 - If it does, **the passage is probably not an argument**. In real-life situations, authors rarely try to prove something is true when everyone already accepts it
 - However, if the **topic sentence makes a claim that many people do not accept or have never thought about**, then the purpose of the remaining sentences **may be both to prove the topic sentence is true as well as to develop it**. If this be so, the passage is an argument

3. Illustrations

- An **expression involving one or more examples that is intended to show what something means or how it is done**
 - Illustrations are **often confused with arguments** because many illustrations **contain indicator words such as “thus”**

Example:

Chemical elements, as well as compounds, can be represented by molecular formulas. Thus, oxygen is represented by “O₂”, water by “H₂O”, and sodium chloride by “NaCl”.

- This passage is not an argument, because it makes no claim that anything is being proved

- The word “thus” indicates **how something is done** - namely, how chemical elements and compounds can be represented by formulas

Note

- **Many illustrations can be taken as arguments.** Such arguments are often called **arguments from example**

Example:

Although most forms of cancer, if untreated, can cause death, not all cancers are life threatening. For example, basal cell carcinoma, the most common of all skin cancers, can produce disfigurement, but it almost never results in death

- the example given is intended to prove the truth of “Not all cancers are life threatening”
- Thus, **the passage is best interpreted as an argument**
- In deciding whether an illustration should be interpreted as an argument, **determine whether it purports to prove something**
- In borderline cases, it helps to note whether the claim being illustrated is one that practically everyone accepts or agrees with
 - If it is, the passage is probably not an argument
 - But if the claim being illustrated is one that **many people do not accept or have never thought about**, then the passage **may be interpreted as an argument**

4. Explanations

- An expression that purports to **shed light on some event or phenomenon**, which is usually accepted as a matter of fact
- It **attempts to clarify, or describe such alike why something is happen that way or why something is what it is**
- Every explanation is composed of two distinct components: the explanandum and explanans
 - ◆ **Explanandum**
 - ✓ the statement that **describes the event or phenomenon to be explained**
 - ◆ **Explanans**
 - ✓ the **statement or group of statements that purports to do the explaining**

Example:

Cows digest grass while humans cannot, because their digestive systems contain enzyme not found in humans

- the explanandum is the statement “Cows digest grass while humans cannot”
- the explanans is “their [cows] digestive systems contain enzyme not found in humans”

Note: Difference between Argument and Explanation

- **Argument:** [Premise - accepted fact] → Claimed to prove → Conclusion
- **Explanation:** Explanans → Claimed to shed light on → [Explanations - accepted fact]

Note

- Explanations are sometimes mistaken for arguments because they often contain the indicator word “because”
 - Yet explanations are not arguments, because in an explanation the purpose of the explanans is **to shed light on, or to make sense of**, the explanandum event, not to prove that it occurred
- the **purpose of the explanans** is to **show why something is the case**, whereas in an argument, the **purpose of the premises** is **to prove that something is the case**
 - In the above example given, the statement that cows’ digestive systems contain enzyme not found in humans is not intended to prove that cows digest grass but humans cannot, but rather to show why it is so
- **in explanation, we precede backward from fact to the cause** whereas **in argument we move from premise to the conclusion**
- some passages can be interpreted as both explanations and arguments

Example:

Women become intoxicated by drinking a smaller amount of alcohol than men because men metabolize part of the alcohol before it reaches the bloodstream, whereas women do not

- The **purpose of this passage** could be to **prove the first statement to those who do not accept it as fact**, and to **shed light on that fact to those who do accept it**

5. Conditional Statements

- A conditional statement is an **“if . . . then . . .”** statement
 - Example:
If you study hard, then you will score “A” grade
- Every conditional statement is made up of two component statements
 - ◆ **the antecedent (if-clause)**
 - The component statement immediately following the **“if”**
 - ◆ **the consequent (then-clause)**
 - the one following the **“then”**
- There is an occasion that the order of antecedent and consequent is reversed
 - when occasionally the word **“then” is left out**, the order of antecedent and consequent is **reversed**
 - Example:

You will score “A” grade if you study hard

- ✦ the antecedent is “You study hard,”
- ✦ the consequent is “You will score “A” grade.”

➤ Meaningful relationship between antecedent and consequent **need not** exist for a statement to count as conditional

➤ Example: *“If Getaneh Kebede is a singer, then Hawassa is in Mekelle”*

- ✦ This statement is a conditional statement

➤ Conditional statements are not arguments, because they fail to meet the criteria at least one statement must claim to present evidence, and there must be a claim that this evidence implies something

- In a conditional statement, there is **no claim** that either the antecedent or the consequent presents evidence
- there is **no assertion** that either the antecedent or the consequent is true. Rather, there is **only the assertion** that if the antecedent is true, then so is the consequent

➤ The fact that a statement begin with “if” makes it the **idea conditional** and not a final reasonable assertion

- That is why also conditional statements are not evaluated as true or false without separately evaluating the antecedent and the consequent
- They only claim that if the antecedent is true then so is the consequent

➤ some conditional statements are similar to arguments in that they express the outcome of a reasoning process. As such, they may be said to have a certain inferential content

➤ Example:

If destroying a political competitor gives you joy, then you have a low sense of morality

- ✦ The link between the antecedent and consequent resembles the inferential link between the premises and conclusion of an argument
- ✦ Yet there is a difference because the premises of an argument are claimed to be true, whereas **no such claim is made for the antecedent** of a conditional statement
- ✦ Accordingly, conditional statements are not arguments

➤ although taken by themselves are not arguments, their **inferential content**, (the inferential content between the antecedent and the consequent), **may be re-expressed to form arguments**

- Example: the conditional statement can be re-expressed to form an argument as follows:

Destroying a political competitor gives you joy. Therefore, you have a low sense of morality

- while **no single conditional statement is an argument**, a conditional statement **may serve as either the premise or the conclusion (or both) of an argument**

- Example:

If he is selling our national secrets to enemies, then he is a traitor

He is selling our national secrets to enemies

Therefore, he is a traitor

- The **relation between conditional statements and arguments** may now be summarized as follows:

- A **single conditional statement is not an argument**
- A **conditional statement may serve as either the premise or the conclusion (or both) of an argument**
- The **inferential content** of a conditional statement may be **re-expressed to form an argument**

Necessary and sufficient conditions

◆ **Sufficient condition**

- **A** is said to be a **sufficient condition for B** whenever the **occurrence of A is all that is needed** for the occurrence of B

- Example:

being a dog is a sufficient condition for being an animal

- ✦ suppose you are given a large, closed cardboard box. Also, suppose you are told that there is a dog in the box

- ✓ you know for sure, there is an animal in the box. **No additional information is needed** to draw this conclusion
- ✓ This means that being a dog is sufficient for being an animal
- ✓ However, being a dog is not necessary for being an animal, because if you are told that the box contains a cat, you can conclude with equal certainty that it contains an animal

- ✦ These idea can be expressed in the following conditional statements:

- ✓ **If X is a dog, then X is an animal**

◆ **Necessary condition**

- **B** is said to be a **necessary condition for A** whenever **A cannot occur without the occurrence of B**

- Example:

being an animal is a necessary condition for being a dog

- ✦ suppose you are given a large, closed cardboard box. Also, suppose you are told that whatever might be in the box, it is not an animal
 - ✓ Then you know for certain there is no dog in the box
 - ✓ being an animal is necessary for being a dog. If there is no animal, there is no dog
 - ✓ However, being an **animal** is **not sufficient** for being a **dog**, because if you are told that the box contains an animal, you **cannot, from this information alone**, conclude that it contains a **dog**. It might contain a cat, a mouse, a squirrel, and so on
- ✦ These idea can be expressed in the following conditional statements:
 - ✓ If X is not an animal, then X is not a dog

Note

- A is a sufficient condition for B; if A occurs, then B must occur
- A is a necessary condition for B; if B occur, then A must occur

Summary Note

- In deciding whether a passage contains an argument, you should look for three things
 - ◆ **indicator words** such as “therefore,” “since,” “because,” and so on
 - ◆ an **inferential relationship** between the statements
 - ◆ **typical kinds of non-arguments**
 - But the mere occurrence of an indicator word does not guarantee the presence of an argument
 - keep in mind that in many arguments that lack indicator words, the conclusion is the first statement

Key Points on Lesson 2

Techniques of Recognizing Arguments

2.1 Recognizing Argumentative Passages

- a passage contains an **argument** if it purports to prove something
- Two conditions must be fulfilled for a passage to purport to prove something:
 - **At least one of the statements must claim to present evidence or reasons**
 - ✦ This condition refers to **premises**
 - ✦ This condition expresses a **factual claim**
 - **There must be a claim that the alleged evidence or reasons supports or implies something - that is, a claim that something follows from the alleged evidence**
 - ✦ This condition refers to a **conclusion**
 - ✦ This condition expresses what is called an **inferential claim**
- It is **not necessary** that the premises present actual evidence or true reasons **nor** that the premises actually do support the conclusion

Inferential claim

- It is **the claim that the passage expresses a certain kind of reasoning process** - that something supports or implies something or that something follows from something
- the inferential claim is an **objective** feature of an argument
- An inferential claim can be either **explicit** or **implicit**
 - ◆ **Explicit inferential claim:** usually asserted by premise or conclusion indicator
 - there is an **indicator word** that asserts an **explicit relationship** between the premises and the conclusions
 - ◆ **Implicit inferential claim:**
 - there is an inferential relationship between the statements in a passage, **but** the passage contains **no indicator words**

Note

- The mere occurrence of an indicator word **by no means guarantees** the presence of an argument
 - make sure that the **existing indicator word** is used to **indicate a premise or a conclusion**

2.2 Recognizing Non-argumentative Passages

- Non-argumentative passages are **passages, which lack an inferential claim**
 - for a passage **to be an argument**, it **not only should contain premises and a conclusion** but also an **inferential claim** or a reasoning process

Some of the most important forms of non-argumentative passages

1. Simple Non-inferential Passages

- unproblematic passages that lack a claim that anything is being proved
- Such passages **contain statements that could be premises or conclusions (or both)**,
 - **But** what is **missing** is a claim that any **potential premise supports a conclusion**
- Passages of this sort include
 - ◆ **Warnings**
 - ◆ **Pieces of advice**
 - ◆ **Statements of belief or opinion**
 - ◆ **Loosely associated statements**
 - ◆ **Reports**

2. Expository Passages

- A kind of discourse that **begins with a topic sentence followed by one or more sentences that develop the topic sentence**
- If the **objective is not to prove the topic sentence but only to expand it or elaborate it**, then there is no argument

Note

- **expository passages differ from simple non-inferential passages in that many of them can also be taken as arguments**
- If the purpose of the subsequent sentences in the passage is **not only to flesh out the topic sentence but also to prove it**, then **the passage is an argument**
 - Thus, **the passage can be taken as both an expository passage and an argument**
- In borderline cases, ask whether the topic sentence makes a claim that everyone accepts or agrees with
 - If it does, the passage is probably not an argument

3. Illustrations

- An expression involving one or more examples that is intended to show **what something means or how it is done**

Note

- **Many illustrations can be taken as arguments.** Such arguments are often called **arguments from example**
- In borderline cases, it helps to note **whether the claim being illustrated is one that practically everyone accepts or agrees with**
 - If it is, the passage is probably not an argument

- But if the claim being illustrated is one that **many people do not accept or have never thought about**, then the passage **may be interpreted as an argument**

4. Explanations

- An expression that purports to **shed light on some event or phenomenon**, which is usually accepted as a matter of fact
- It **attempts to clarify, or describe such alike why something is happen that way or why something is what it is**
- Every explanation is composed of two distinct components:
 - ◆ **Explanandum**
 - ✓ the statement that **describes the event or phenomenon to be explained**
 - ◆ **Explanans**
 - ✓ the **statement or group of statements that purports to do the explaining**

Note: Difference between Argument and Explanation

- **Argument**: [Premise - accepted fact] → Claimed to prove → Conclusion
- **Explanation**: Explanans → Claimed to shed light on → [Explanations - accepted fact]

Note

- the **purpose of the explanans** is to **show why something is the case**, whereas in an argument, the **purpose of the premises** is to **prove that something is the case**
- **in explanation, we precede backward from fact to the cause** whereas **in argument we move from premise to the conclusion**
- some passages can be interpreted as both explanations and arguments
 - The **purpose of this passage could be to prove the first statement to those who do not accept it as fact, and to shed light on that fact to those who do accept it**

5. Conditional Statements

- A conditional statement is an **“if . . . then . . .”** statement
- Every conditional statement is made up of two component statements
 - ◆ **the antecedent (if-clause)**: statement immediately following the **“if”**
 - ◆ **the consequent (then-clause)**: the one following the **“then”**
- When occasionally the word **“then” is left out**, the order of antecedent and consequent is **reversed**
- Meaningful relationship between antecedent and consequent **need not** exist for a statement to count as conditional
- Conditional statements are not arguments
 - there is **no claim** that either the antecedent or consequent presents evidence

- there is **no assertion** that either the antecedent or the consequent is true. Rather, there is only the assertion that if the antecedent is true, then so is the consequent
- The fact that a statement begin with “if” makes it the **idea conditional** and not a final reasonable assertion
- some conditional statements are similar to arguments in that they express the outcome of a reasoning process. As such, they may be said to have a certain inferential content
- although taken by themselves are not arguments, their **inferential content**, (the inferential content between the antecedent and the consequent), may be re-expressed to form arguments
- while **no single conditional statement is an argument**, a conditional statement may serve as either the premise or the conclusion (or both) of an argument
- The relation between conditional statements and arguments:
 - A single conditional statement is **not an argument**
 - A conditional statement may serve as **either the premise or the conclusion (or both)** of an argument
 - The **inferential content** of a conditional statement may be re-expressed to form an argument

Necessary and sufficient conditions

◆ Sufficient condition

- A is said to be a **sufficient condition for B** whenever the occurrence of A is **all that is needed** for the occurrence of B
- A is a sufficient condition for B; if A occurs, then B must occur

◆ Necessary condition

- B is said to be a **necessary condition for A** whenever A **cannot occur without the occurrence of B**
- A is a necessary condition for B; if B occur, then A must occur

Summary Note

- In deciding whether a passage contains an argument, you should look for three things
 - ◆ **indicator words** such as “therefore,” “since,” “because,” and so on
 - ◆ an **inferential relationship** between the statements
 - ◆ **typical kinds of non-arguments**



University Exams

Lesson 2: Techniques of Recognizing Arguments

Instruction: True/False

1. Giving birth is a sufficient condition for being a parent

✓ Answer: True

≡ Explanation: This question is a bit confusing because we have to first agree on what does being a parent mean. But in a loose definition if being a parent means having a child of one's own, giving birth is a sufficient condition for being a parent. Because in this definition for parent, whenever giving birth occurrence that is all needed for the occurrence being a parent.

📖 Module Reference: A is said to be a sufficient condition for B whenever the occurrence of A is all that is needed for the occurrence of B. For example, being a dog is a sufficient condition for being an animal – Module Page 62 Line 7

Addis Ababa University

Instruction: Multiple Choice

2. [A] We were later for class [B] because we were having a breakfast. What we can say about the relationship of these two statements?

A. A because B here implies no kind of reason at all

B. A because B justifies what is the case

C. A because B presents both reason of why and what is the case

D. A because B explains why something is the case

E. A because B in this context says there is identical appearance of the premise and the explanans

✓ Answer: D

≡ Explanation: explanation answers the question of why something is the case, or why something happened. In this statement [B] - we were having a breakfast Explains why [A] - we were later for class

 Module Reference: the purpose of the explanans is to show why something is the case, whereas in an argument, the purpose of the premises is to prove that something is the case – Module Page 58 Line 4

Addis Ababa University

3. “The reason poverty is rising worldwide is that the global economy has made it impossible for countries to provide stable working conditions for its citizens.” This passage can be identified as?

- A. Argument
- B. Report
- C. Explanation
- D. Illustration
- E. Exposition

☒ Answer: C

 Explanation: The statement is explaining why poverty is rising worldwide. There is no inferential link between the statements to prove anything

 Module Reference: In an explanation the purpose of the explanans is to shed light on, or to make sense of, the explanandum event, not to prove that it occurred. In other words, the purpose of the explanans is to show why something is the case – Module Page 58 Line 2

Addis Ababa University

4. Claude Sumner initiated the project of studying the written sources of Ethiopian philosophy. He also analyzed the role of oral literature and western literature for the understanding of Ethiopian philosophy. As such, Claude Sumner could be seen as the greatest thinker in the development of Ethiopian philosophy

- A. Argument; conclusion: initiated the project of studying the written sources of Ethiopian philosophy
- B. Argument; conclusion: As such, Claude Sumner could be seen as the greatest thinker in the development of Ethiopian philosophy
- C. Argument; conclusion: analyzed the role of oral literature
- D. Non-argument

E. Explanation

✓ Answer: B

≡ Explanation: This is an argument because it presents a claim (the conclusion) that is supported by reasons (the premises). The conclusion is the last sentence, which expresses the author's opinion about Claude Sumner's contribution to Ethiopian philosophy. The premises are the previous sentences, which provide some facts about Claude Sumner's work and achievements

📖 Module Reference: When we define an arguments from logical point of view, it is a group of statements, one or more of which (the premise) are claimed to provide support for, or reason to believe, one of the other, the (conclusion) – Module Page 42 Line 6

Addis Ababa University

5. Emperor Tewedros II is the greatest architect of Ethiopian modernity. He tried to revolutionize existing relations between the state and church; he tried to build a modern army and also sought to establish foreign relations with western European nations

A. Argument; conclusion: He tried to revolutionize existing relations between the state and church

B. Argument: he tried to build modern army

C. Expository passage

E. Argument; conclusion: Emperor Tewedros II is the grand architect of Ethiopian modernity

F. All

✓ Answer: E

≡ Explanation: This is an argument because it presents a claim (the conclusion - Emperor Tewedros II is the grand architect of Ethiopian modernity) that is supported by reasons (the premises - He tried to revolutionize existing relations between the state and church; he tried to build a modern army; he sought to establish foreign relations with western European nations)

📖 Module Reference: When we define an arguments from logical point of view, it is a group of statements, one or more of which (the premise) are claimed to provide support for, or reason to believe, one of the other, the (conclusion) – Module Page 42 Line 6



Practice Questions

Lesson 2: Techniques of Recognizing Arguments

Instruction: Determine which of the following passages are arguments. For those that are, identify the conclusion. For those that are not, determine the kind of nonargument

1. The turkey vulture is called by that name because its red featherless head resembles the head of a wild turkey.

✓ Answer: Nonargument; explanation

2. A mammal is a vertebrate animal that nurses its off spring. Thus, cats and dogs are mammals, as are sheep, monkeys, rabbits, and bears.

✓ Answer: Nonargument; illustration

3. If stem-cell research is restricted, then future cures will not materialize. If future cures do not materialize, then people will die prematurely. Therefore, if stem-cell research is restricted, then people will die prematurely.

✓ Answer: Argument (conclusion: If stem-cell research is restricted, then people will die prematurely)

4. Five college students who were accused of sneaking into the Cincinnati Zoo and trying to ride the camels pleaded no contest to criminal trespass yesterday. The students scaled a fence to get into the zoo and then climbed another fence to get into the camel pit before security officials caught them, zoo officials said.

✓ Answer: Nonargument; report

5. We as a nation have been guilty of far too many excesses for too long. We waste more than most in the rest of the world. It is time we sucked it in and tightened our belts. Our families, our nation and the rest of the world will only be better off.

✓ Answer: Nonargument; opinion and piece of advice

6. Bear one thing in mind before you begin to write your paper: Famous literary works, especially works regarded as classics, have been thoroughly studied to the point where prevailing opinion on them has assumed the character of orthodoxy.

✓ Answer: Nonargument; piece of advice

7. For organisms at the sea surface, sinking into deep water usually means death. Plant cells cannot photosynthesize in the dark depths. Fishes and other animals that descend lose contact with the main surface food supply and themselves become food for strange deep-living predators.

✓ Answer: Argument (conclusion: For organisms at the sea surface, sinking into deep water usually means death)

8. Atoms are the basic building blocks of all matter. They can combine to form molecules, whose properties are generally very different from those of the constituent atoms. Table salt, for example, a simple chemical compound formed from chlorine and sodium, resembles neither the poisonous gas nor the highly reactive metal.

✓ Answer: Argument (conclusion: Atoms can combine to form molecules whose properties generally are very different from those of the constituent atoms)

9. It is usually easy to decide whether or not something is alive. This is because living things share many common attributes, such as the capacity to extract energy from nutrients to drive their various functions, the power to actively respond to changes in their environment, and the ability to grow, to differentiate, and to reproduce.

✓ Answer: Nonargument; explanation

10. A person never becomes truly self-reliant. Even though he deals effectively with things, he is necessarily dependent upon those who have taught him to do so. They have selected the things he is dependent upon and determined the kinds and degrees of dependencies.

✓ Answer: Argument (conclusion: A person never becomes truly self-reliant)

11. In areas where rats are a problem, it is very difficult to exterminate them with bait poison. That's because some rats eat enough poison to die but others eat only enough to become sick and then learn to avoid that particular poison taste in the future.

✓ Answer: This passage could be both an argument and an explanation (conclusion: In areas where rats are a problem, it is very difficult to exterminate them with bait poison)

12. Nations are made in two ways, by the slow working of history or the galvanic force of ideas. Most nations are made the former way, emerging slowly from the mist of the past, gradually coalescing within concentric circles of shared sympathies, with an accretion of consensual institutions. But a few nations are formed and defined by the citizens' assent to a shared philosophy.

✓ Answer: Nonargument; loosely associated statements

Instruction: Fill in the blanks with “necessary” or “sufficient” to make the following statements true. After the blanks have been filled in, express the result in terms of conditional statements.

13. Being a tiger is a ____ condition for being an animal.

✓ Answer: Sufficient: If something is a tiger, then it is an animal

14. Having a racket is a ____ condition for playing tennis.

✓ Answer: Necessary: If a person has no racket, then he/she cannot play tennis. Or, If a person plays tennis, then he/she has a racket

15. Burning leaves is a ____ condition for producing smoke.

✓ Answer: Sufficient: If leaves burn, then smoke is produced

16. Uttering a falsehood is a ____ condition for telling a lie.

✓ Answer: Necessary: If a person does not utter a falsehood, then he or she does not tell a lie. Or, If a person tells a lie, then he or she utters a falsehood

Lesson 3: Types of Arguments: Deduction and Induction

- Every argument makes a claim that its premises provide grounds for the truth of its conclusion
 - Strength of this claim is Just how strongly is the conclusion claimed to follow from the premises
- The reasoning process (inference) that an argument involves is expressed either with **certainty** or with **probability**
 - If the conclusion is claimed to follow with **strict certainty or necessity**, the argument is said to be **deductive**
 - if it is claimed to follow **only probably**, the argument is said to be **inductive**
- the two great classes of arguments: Deductive arguments and Inductive arguments

3.1 Deductive Arguments

- an argument incorporating the claim that **it is impossible for the conclusion to be false given that the premises are true**
 - the premises are claimed to support the conclusion in such a way that it is impossible for the premises to be true and the conclusion false
 - the conclusion is claimed to follow **necessarily (conclusively)** from the premises
- deductive arguments are those that **involve necessary reasoning**
 - Example:
All philosophers are critical thinkers
Socrates is a philosopher
Therefore, Socrates is a critical thinker
 - ✦ If we assume that all philosophers are critical thinkers and that Socrates is a philosopher, then it is impossible that Socrates not be a critical thinker

3.2 Inductive Arguments

- an argument incorporating the claim that **it is improbable for the conclusion to be false given that the premises are true**
 - the premises are claimed to support the conclusion in such a way that it is **improbable for the premises to be true and the conclusion false**
 - the conclusion is claimed to follow **only probably** from the premises
- premises may provide some considerable evidence for the conclusion but they do **not imply (necessarily support)** the conclusion
 - we might have sufficient condition (evidence) **but we cannot be certain** about the truth of the conclusion
- this does not mean that the conclusion is wrong or unacceptable, where as it could be correct or acceptable but only based on probability

➤ inductive arguments are those that **involve probabilistic reasoning**

➤ Example:

Most African leaders are blacks

Mandela was an African leader

Therefore, probably Mandela was black

- ✦ the conclusion **does not follow** from the premises with strict necessity, but it **does follow with some degree of probability**
- ✦ If we assume that most African leaders were blacks and that Mandela was an African leader, then it is improbable that Mandela not been a black, or it is probable that Mandela was black
- ✦ But **it is not impossible** that Mandela not been a black

3.3 Differentiating Deductive and Inductive Arguments

- the **distinction between inductive and deductive** arguments lies in the **strength of an argument's inferential claim**
 - the distinction lies on **how strongly the conclusion is claimed to follow from the premises**, or **how strongly the premises are claimed to support the conclusion**
- In the deciding whether an argument is deductive or inductive, **we must look at certain objective features of the argument**
- There are **three factors** that influence the decision about the deductiveness or inductiveness of an argument's inferential claim
 - ◆ The **occurrence of special indicator words**
 - ◆ The **actual strength of the inferential link between premises and conclusion**
 - ◆ The **character or form of argumentation the arguers use**

1. The occurrence of special indicator words

- Arguments may contain some words that indicate the arguer's certainty and confidence, or the arguer's uncertainty or doubt, about the truth of his/her conclusion
 - Words like **"certainly," "necessarily," "absolutely,"** and **"definitely"** indicate that the argument **should be taken as deductive**
 - Words like, **"probable," "improbable," "plausible," "implausible," "likely," "unlikely,"** and **"reasonable to conclude"** suggest that **an argument is inductive**
- if an argument draws its conclusion, using either of the **deductive indicator words**, it is usually best to **interpret it as deductive**, but if it draws its conclusion, using either of the **inductive indicator words**, it is usually best to **interpret it as inductive**

Note

- the phrase “**it must be the case that**” is **ambiguous**; “**must**” can indicate either probability or necessity
- one should be cautious about these **special indicator words**, because **if they conflict with one of the other criteria, we should probably ignore them**
 - arguers often use phrases such as “**it certainly follows that**” for **rhetorical purposes** to add impact to their conclusion and not to suggest that the argument be taken as deductive
 - some arguers, not knowing the distinction between inductive and deductive, will claim to “deduce” a conclusion when their argument is more correctly interpreted as inductive
 - ✦ If one takes these words at face value, then one might wrongly leads into wrong conclusions
 - ✦ the **occurrence of an indicator word is not a certain guarantee** for the **deductiveness or inductiveness** of an argument unless it is supported by the other features

2. The actual strength of the inferential link between premises and conclusion

- If the conclusion actually does **follow with strict necessity** from the premises, the argument is clearly **deductive**
 - Example:

All Ethiopian people love their country
Debebe is an Ethiopian
Therefore, Debebe loves his country

 - ✦ the **conclusion follows with strict necessity from the premises**
 - ✦ If we assume that all Ethiopian people love their country and that Debebe is an Ethiopian, then it is impossible that Debebe not love his country
 - ✦ Thus, we should interpret this argument as deductive
- If the conclusion of an argument **does not follow with strict necessity but does follow probably**, it is usually best to interpret it as **inductive argument**
 - Example:

The majority of Ethiopian people are poor
Alamudin is an Ethiopian
Therefore, Alamudin is poor

 - ✦ the conclusion does not follow from the premises with strict necessity, but it does **follow with some degree of probability**
 - ✦ If we assume that the premises are true, then **based on that assumption it is probable** that the conclusion is true
 - ✦ Thus, it is best to interpret this argument as inductive

Note

- Occasionally, an argument contains no special indicator words, and the conclusion does not follow either necessarily or probably from the premises; in other words, it does not follow at all
 - This situation points up the need for the third factor to be taken into account, which is the character or form of argumentation the arguer uses

3. The character or form of argumentation the arguer uses

A. Instances of Deductive Argumentative Forms

- Many arguments have a distinctive character or form that indicates that the premises are supposed to **provide absolute support** for the conclusion
- Examples of such forms or kinds of argumentation are:
 - ◆ **Argument based on mathematics**
 - an argument in which the conclusions depend on some **purely arithmetic or geometric computation or measurement**
 - Example:
you can put two orange and three bananas in a bag and conclude that the bag contains five fruits
 - **Exception**
 - ◆ arguments that **depend on statistics** are usually best interpreted as **inductive**
 - ◆ **Arguments based on definition**
 - an argument in which the conclusion is claimed to **depend merely up on the definition of some words or phrase** used in the premise or conclusion
 - Example:
Kebede is a physician; therefore, he is a doctor
 - ◆ These argument is deductive because its conclusions **follow with necessity from the definitions “physician”**
 - ◆ **Syllogisms**
 - arguments **consisting of exactly two premises and one conclusion**
 - Syllogisms categorized into three groups:
 - ◆ **Categorical syllogism**
 - ✓ a syllogism in which the **statement begins with** one of the words “**all**”, “**no**” and “**some**”
 - ✓ Example:
All Egyptians are Muslims
No Muslim is a Christian
Hence, no Egyptian is a Christian
 - ◆ **Hypothetical syllogism**

✓ a syllogism **having a conditional statement for one or both of its premises**

✓ Example:

If you study hard, then you will graduate with Distinction

If you graduate with Distinction, then you will get a rewarding job

Therefore, if you study hard, then you will get a rewarding job

◆ **Disjunctive syllogism**

✓ a syllogism **having a disjunctive statement** (i.e. an “**either ... or**” statement)

✓ Example:

Rewina is either Ethiopian or Eritrean

Rewina is not Eritrean

Therefore, Rewina is Ethiopian

B. Instances of Inductive Argumentative Forms

➤ In general, **inductive arguments** are such that the **content of the conclusion** is in some way intended to “**go beyond**” the **content of the premises**

➤ The **premises** of such an argument typically deal with some subject that is **relatively familiar**, and the **conclusion** then moves beyond this to a subject that is **less familiar** or that little is known about

➤ Such an argument may take any of several forms:

◆ **Prediction**

➤ the **premises** deals with some known event in the **present** or the **past** and the **conclusions** moves beyond this event to some event to relative **future**

➤ Example:

one may argue that because certain clouds develop in the center of the highland, a rain will fall within twenty-four hours

✦ Nearly everyone realizes that **the future cannot be known with certainty**

✦ whenever an argument makes a prediction about the future one is usually **justified considering the argument inductive**

◆ **An argument from analogy**

➤ an argument that **depends on the existence of an analogy or similarity between two things** or state of affairs

➤ Because of the existence of this analogy a certain **conditions** that **affects the better - known thing** or situations is **concluded to affect the less familiar**, lesser known-thing or situation

➤ Example:

one may conclude, after observing the similarity of some features of Computer A and car B: that both are manufactured in 2012; that both are easy to access; that

Computer A is fast in processing; it follows that Computer B is also fast in processing

✦ The **certitude** attending such an inference is obviously **probabilistic** at best

◆ An inductive generalization

- an argument that **proceeds from the knowledge of a selected sample** to some claim about the **whole group**
- **Because the members** of the sample have a **certain characteristics**, it is argued that **all members of the group have the same characteristics**

➤ Example:

one may argue that because three out of four people in a single prison are black, one may conclude that three-fourth of prison populations are blacks

✦ This example **illustrate the use of statistics in inductive argumentation**

◆ An argument from authority

- an argument in which the **conclusions rest upon a statement made by some presumed authority or witness**

➤ Example:

A lawyer argue that the person is guilty because an eyewitness testifies to that effect under oath

Example:

one may argue that all matters are made up of a small particles called “quarks” because the University Professor said so

✦ Because the professor and the eyewitness **could be either mistaken or lying**, such arguments are essentially **probabilistic**

◆ Arguments based on sign

- an argument that **proceeds from the knowledge of a certain sign to the knowledge of a thing or situation that the sign symbolizes**

➤ Example:

one may infer that after observing “No Parking” sign posted on the side of a road, the area is not allowed for parking

✦ But **because the sign might be displaced or in error about the area or forgotten**, conclusion follows only probably

◆ A causal inference

- an argument which **proceed from the knowledge of a cause to the knowledge of an effect, or conversely, from the knowledge of an effect to knowledge of a cause**

➤ Example:

from the knowledge that a bottle of water had been accidentally left in the freezer overnight, someone might conclude that it had frozen (cause to effect)

- ✦ Because **specific instances of cause and effect can never be known with absolute certainty**, one may usually interpret such an argument as inductive

Furthermore Considerations

- We should take care **not to confuse arguments in geometry, which are always deductive**, with arguments from **analogy or inductive generalizations**
 - Example:
an argument concluding that a triangle has a certain attribute (such as a right angle) because another triangle, with which it is congruent, also has that attribute
 - ✦ It **might be mistaken** for an argument from analogy
- **Scientific arguments**: arguments that occur in science **can be either inductive or deductive**, depending on the circumstances
 - In general, **arguments aimed at the discovery of a law of nature** are usually considered **inductive**
 - argument that occurs **in science has to do with the application of known laws to specific circumstances** are often considered to be **deductive**, but only with certain reservations
- There are deductive arguments that proceed **from the general to the general**, from the **particular to the particular**, and from the **particular to the general**, as well as from the **general to the particular**; and there are inductive arguments that do the same
 - ✦ A **particular statement** is one that makes a **claim about one or more particular members of a class**; **general statement** makes a claim about **all the members of a class**
 - Example:
Three is a prime number
Five is a prime number
Seven is a prime number
Therefore, all odd numbers between two and eight are prime numbers
 - ✦ This is a **deductive argument** that proceeds **from the particular to the general**
 - Example:
All emeralds previously found have been green
Therefore, the next emerald to be found will be green
 - ✦ is an **inductive argument** that proceeds **from the general to the particular**
- In sum up, **to distinguish deductive arguments from inductive**, we look for

- special **indicator words**
- the **actual strength of the inferential link** between premises and conclusion
- the **character or form of argumentation**

Key Points on Lesson 3

Types of Arguments: Deduction and Induction

- The reasoning process (inference) that an argument involves is expressed either with **certainty** or with **probability**
 - If the conclusion is claimed to follow with **strict certainty or necessity**, the argument is said to be **deductive**
 - if it is claimed to follow **only probably**, the argument is said to be **inductive**

3.1 Deductive Arguments

- incorporating the claim that **it is impossible for the conclusion to be false given that the premises are true**
 - the conclusion is claimed to follow **necessarily (conclusively)** from the premises

3.2 Inductive Arguments

- an argument incorporating the claim that **it is improbable for the conclusion to be false given that the premises are true**
 - the conclusion is claimed to follow **only probably** from the premises

3.3 Differentiating Deductive and Inductive Arguments

- the **distinction between inductive and deductive** arguments lies in the **strength of an argument's inferential claim**
- There are **three factors** that influence the decision about the deductiveness or inductiveness of an argument's inferential claim

1. The occurrence of special indicator words

- Words like **"certainly," "necessarily," "absolutely,"** and **"definitely"** indicate that the argument should be taken as **deductive**
- Words like, **"probable," "improbable," "plausible," "implausible," "likely," "unlikely,"** and **"reasonable to conclude"** suggest that an argument is **inductive**

Note

- If special indicator words **conflict** with one of the other criteria, we should probably **ignore them**
 - ✦ the **occurrence of an indicator word is not a certain guarantee** for deductiveness or inductiveness

2. The actual strength of the inferential link between premises and conclusion

- If the conclusion actually does **follow with strict necessity** from the premises, the argument is clearly **deductive**
 - Example:

All Ethiopian people love their country

Debebe is an Ethiopian

Therefore, Debebe loves his country

- If the conclusion of an argument **does not follow with strict necessity** but **does follow probably**, it is usually best to interpret it as **inductive argument**

- Example:

The majority of Ethiopian people are poor

Alamudin is an Ethiopian

Therefore, Alamudin is poor

3. The character or form of argumentation the arguer uses

A. Instances of Deductive Argumentative Forms

- the premises are supposed to **provide absolute support** for the conclusion
- Such forms or kinds of argumentation are:
 - ◆ **Argument based on mathematics**
 - an argument in which the conclusions depend on some **purely arithmetic or geometric computation or measurement**
 - **Exception**
 - ◆ **arguments** that **depend on statistics** are usually best interpreted as **inductive**
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 - an argument in which the conclusion is claimed to **depend merely up on the definition of some words or phrase** used in the premise or conclusion
 - ◆ **Syllogisms**
 - arguments consisting of **exactly two premises and one conclusion**
 - ◆ **Categorical syllogism**
 - ✓ a syllogism in which the **statement begins with** one of the words “**all**”, “**no**” and “**some**”
 - ◆ **Hypothetical syllogism**
 - ✓ a syllogism having a **conditional statement** for one or both of its **premises**
 - ◆ **Disjunctive syllogism**
 - ✓ a syllogism having a **disjunctive statement** (i.e. an “**either ... or**” statement)

B. Instances of Inductive Argumentative Forms

- In general, **inductive arguments** are such that the **content of the conclusion** is in some way intended to “**go beyond**” the content of the premises
- Such an argument may take any of several forms:
 - ◆ **Prediction**

- the **premises** deals with some known event in the **present** or the **past** and the **conclusions** moves beyond this event to some event to relative **future**
- ◆ **An argument from analogy**
 - an argument that depends on the existence of an **analogy** or **similarity between two things** or state of affairs
 - A certain **conditions** that **affects** the **better - known thing** or situations is **concluded** to **affect the less familiar**, lesser known-thing or situation
- ◆ **An inductive generalization**
 - an argument that proceeds **from the knowledge of a selected sample** to some claim about the **whole group**
 - **Because the members** of the sample have a **certain characteristics**, it is argued that **all members of the group have the same characteristics**
- ◆ **An argument from authority**
 - an argument in which the conclusions rest upon a **statement made by** some **presumed authority or witness**
- ◆ **Arguments based on sign**
 - an argument that proceeds from the **knowledge of a certain sign** to the knowledge of a **thing or situation that the sign symbolizes**
- ◆ **A causal inference**
 - an argument which proceed from the knowledge of a cause to the knowledge of an effect, or conversely, from the knowledge of an effect to knowledge of a cause

Furthermore Considerations

- We should take care **not to confuse arguments in geometry, which are always deductive**, with arguments from **analogy or inductive generalizations**
- **Scientific arguments**: arguments that occur in science **can be either inductive or deductive**, depending on the circumstances
 - arguments aimed at the **discovery of a law of nature** are usually considered **inductive**
 - argument that occurs **in science has to do with the application of known laws to specific circumstances** are often considered to be **deductive**



University Exams

Lesson 3: Types of Arguments: Deduction and Induction

Instruction: True/False

1. An argument that draws a conclusion that something is true because someone has said that it is, is an inductive argument

✓ Answer: True

≡ Explanation: This is an inductive argument form known as argument from authority

📖 Module Reference: An argument from authority: it is an argument in which the conclusions rest upon a statement made by some presumed authority or witness –
Module Page 71 Line 21

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2. It must be raining outside. After all, if it weren't, then the ground would be dry, but it's soaking wet, this argument can be best regarded as a deductive argument

✓ Answer: False

≡ Explanation: This is the Instances of the Inductive argumentative form: causal inference.

📖 Module Reference: A causal inference: it is an argument which proceed from the knowledge of a cause to the knowledge of an effect, or conversely, from the knowledge of an effect to knowledge of a cause. For example, from the knowledge that a bottle of water had been accidentally left in the freezer overnight, someone might conclude that it had frozen (cause to effect)

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Practice Questions

Lesson 3: Types of Arguments: Deduction and Induction

Instruction: Determine whether the following arguments are best interpreted as being inductive or deductive. Also state the criteria you use in reaching your decision (i.e., the presence of indicator words, the nature of the inferential link between premises and conclusion, or the character or form of argumentation)

1. Because triangle A is congruent with triangle B, and triangle A is isosceles, it follows that triangle B is isosceles

✓ Answer: Deductive (argument based on mathematics; also, conclusion follows necessarily from the premises)

2. No e-mail messages are eloquent creations. Some love letters are eloquent creations. Therefore, some love letters are not e-mail messages

✓ Answer: Deductive (categorical syllogism; also, conclusion follows necessarily from the premises)

3. Paying off terrorists in exchange for hostages is not a wise policy, since such action will only lead them to take more hostages in the future

✓ Answer: Inductive (causal inference; also, conclusion follows only probably from the premise)

4. The Encyclopedia Britannica has an article on symbiosis. The Encyclopedia Americana, like the Britannica, is an excellent reference work. Therefore, the Americana probably also has an article on symbiosis

✓ Answer: Inductive (argument from analogy; also, conclusion follows only probably from the premise)

5. World-renowned physicist Stephen Hawking says that the condition of the universe at the instant of the Big Bang was more highly ordered than it is today. In view of Hawking's stature in the scientific community, we should conclude that this description of the universe is correct

✓ Answer: Inductive (argument from authority; also, conclusion follows only probably from the premise)

6. Each element, such as hydrogen and iron, has a set of gaps — wavelengths that it absorbs rather than radiates. So if those wavelengths are missing from the spectrum, you know that that element is present in the star you are observing

✓ Answer: Deductive (conclusion follows necessarily from the premise)

7. When the Romans occupied England, coal was burned. Since coal produces quite a bit of soot and sulfur dioxide, there must have been days almost 2000 years ago when the air in the larger towns was badly polluted

✓ Answer: Inductive (causal inference; also, conclusion follows only probably from the premises)

8. Lenses function by refracting light at their surfaces. Consequently, their action depends not only on the shape of the lens surfaces, but also on the indices of refraction of the lens material and the surrounding medium

✓ Answer: Deductive (conclusion follows necessarily from the premise; this example might also be interpreted as an argument from definition — the definition of “refraction”)

9. The Simpson incident had shown me that a dog was kept in the stables, and yet, though someone had been in and had fetched out a horse, he had not barked enough to arouse the two lads in the loft . Obviously the midnight visitor was someone whom the dog knew well

✓ Answer: Inductive (causal inference: The dog’s familiarity with the visitor caused the dog to be silent)

10. Animals that live on plant foods must eat large quantities of vegetation, and this consumes much of their time. Meat eaters, by contrast, have no need to eat so much or so often. Consequently, meat-eating hominines [early humans] may have had more leisure time available to explore and manipulate their environment; like lions and leopards, they would have time to spend lying around and playing

✓ Answer: Inductive (causal inference; also, the word “may” suggests a probabilistic inference)

Lesson 4: Evaluating Arguments

➤ Every argument makes two basic claims

◆ Factual claim

➤ A claim that **evidence or reasons exist**

◆ Inferential claim

➤ A claim that the **alleged evidence or reasons support something** (or that **something follows from the alleged evidence or reasons**)

➤ The **evaluation of every argument centers on the evaluation of these two claims**

➤ The **most important** of the two is the **inferential claim**, because if the premises fail to support the conclusion (that is, **if the reasoning is bad**), an **argument is worthless**

✦ Thus, we will always **test the inferential claim first**, and **only if the premises do support the conclusion will we test the factual claim** (that is, the claim that the premises present genuine evidence, or are true)

4.1 Evaluating Deductive Arguments: Validity, Truth, and Soundness

Deduction and Validity

◆ Valid deductive argument

➤ an argument such that **if the premises are assumed true, it is impossible** for the **conclusion to be false**

➤ the **conclusion follows with strict necessity** from the premises

➤ Example:

All men are mammals

All bulls are men

Therefore, all bulls are mammals

✦ This is valid argument, because the conclusion actually followed from the premises with a strict necessity

✦ If all men are assumed as mammals and bulls as men, then it is impossible for bulls not be mammals

◆ Invalid deductive argument

➤ an argument such that **if the premises are assumed true, it is possible** for the **conclusion to be false**

➤ the **conclusion does not follow with strict necessity** from the premises, even though it is claimed to

➤ Example:

All philosophers are rational

Socrates was rational

Therefore, Socrates was a philosopher

- ✦ This is invalid argument, because the conclusion did not actually follow from the premises with a strict necessity, even though it is claimed to
- ✦ even if we assume that all philosophers rational and Socrates is rational, **it is not actually impossible for Socrates not be a philosopher**

Note

- **There is no middle ground between valid and invalid**
 - An argument is **either valid or invalid**
- **There is only an indirect relation between validity and truth**
 - For an argument to be valid **it is not necessary** that either the premises or the conclusions **be true**, but merely that if the premises **assumed true**, it is impossible for the conclusion be false
 - We **do not have to know** whether the premise of an argument is **actually true** in order to determine its validity (valid or invalid)
 - Thus, the **validity of argument is the connection between premise and conclusion rather than on the actual truth or falsity** of the statement formed the argument
- There are four possibilities with respect to the truth or falsity of the premises and conclusion of a given argument:
 - True premises and True conclusion
 - True premises and False conclusion
 - False premises and True conclusion
 - False premises and False conclusion
 - ✦ all of the above possibilities, except the second case (true premises and false conclusion), allow for both valid and invalid arguments
 - ✦ the second case does not allow for valid arguments
 - ✓ any argument having this combination is necessarily invalid

Validity and Truth Value

1. Possibility One

- Combination of **True premises and True conclusion** (the first case)
- It **allows for both valid and invalid arguments**
 - Example (Valid):
All women are mammals. (Tp)
My mother is a mammal. (Tp)
Therefore, my mother is a woman. (Tc)
 - Example (Invalid):

All philosophers are critical thinkers. (Tp)

Plato was a critical thinker. (Tp)

Therefore, Plato was a philosopher. (Tc)

2. Possibility Two

➤ combination of **True premises** and **False conclusion** (the second case)

➤ It **allows only for invalid arguments**

➤ Example (Invalid):

All biologists are scientists. (Tp)

John Nash was a scientist. (Tp)

Therefore, John Nash was a biologist. (Fc)

✦ A valid argument with such combination does not exist

➤ Any deductive argument **having actually true premises and an actually false conclusion is invalid**

➤ **because** if the premises are actually true and the conclusion is actually false, then **it certainly is possible for the premises to be true and the conclusion false**

➤ Thus, **by definition, the argument is invalid**

✦ After all **such combinations are contrary to the inferential claim of a deductive argument**: if the premises are assumed to be true, then it is impossible for the conclusion to be false

3. Possibility Three

➤ combination of **False premises** and **True conclusion** (the third case)

➤ It **allows for both valid and invalid arguments**

➤ Example (Valid):

All birds are mammals. (Fp)

All women are birds. (Fp)

Therefore, all women are mammals. (Tc)

➤ Example (Invalid):

All birds are mammals. (Fp)

All ostriches are mammals. (Fp)

Therefore, all ostriches are birds. (Tc)

4. Possibility Four

➤ Combination of **False premises** and **False conclusion** (the fourth case)

➤ It **allows for both valid and invalid arguments**

➤ Example (Valid):

All Americans are Ethiopians. (Fp)

All Egyptians are Americans. (Fp)

Thus, all Egyptians are Ethiopians. (Fc)

➤ Example (Invalid):

All birds are mammals. (Fp)

All ants are mammals. (Fp)

Therefore, all ants are birds. (Fc)

Note

- The basic idea of evaluating deductive argument is not whether premises and conclusion are true or false (truth or falsity), but **whether the premises support the conclusion**
- Nevertheless, **there is one arrangement** of truth and falsity in the premises and conclusion that **does determine the issue of validity**
 - Any **deductive argument** having **actually true premises** and an **actually false conclusion** is **invalid**
- **relationship between the validity of a deductive argument** and the truth and falsity of its premises and conclusions summarized as follows

Premises	Conclusion	Validity
True	True	Valid/invalid
True	False	Invalid
False	True	Valid/invalid
False	False	Valid/invalid

Deduction and Soundness

- Depending on their actual **ability to accomplish their factual claims**, deductive arguments can be either sound or unsound
 - ◆ **Sound argument**
 - A deductive argument that is **Both valid** and has **all true premises**
 - Valid argument is one such that it is **impossible for the premises to be true and the conclusion false**
 - ✦ Thus by definition, **Every sound argument will have a true conclusion**
 - ◆ **Unsound argument**
 - A deductive argument that is **either valid with one or more false premises, or invalid, or both**
 - A deductive argument that **does not actually accomplish its inferential claim, (that is not valid)**, cannot be sound, regardless of the truth values of its premises

4.2 Evaluating Inductive Arguments: Strength, Truth, and Cogency

Induction and Strength

◆ Strong inductive argument

- › an argument such that if the premises are assumed true, it is improbable for the conclusion to be false
- › the conclusion follows probably from the premises
- › Example:

This barrel contains one hundred apples

Eighty apples selected at random were found tasty

Therefore, probably all one hundred apples are tasty

- ◆ This is strong argument, because the conclusion actually follows probably from the premises

◆ Weak inductive argument

- › an argument such that if the premises are assumed true, it is probable for the conclusions to be false
- › the conclusion does not follow probably from the premises, even though it is claimed to
- › Example:

This barrel contains one hundred apples

Three apples selected at random were found tasty

Therefore, probably all one hundred apples are tasty

- ◆ This is weak argument, because the conclusion does not actually follow probably from the premises, even though it is claimed to

Note

- › Unlike the validity and invalidity of deductive arguments, the strength and weakness of inductive arguments admit certain form of degrees
 - › To be considered strong, an inductive argument must have a conclusion that is more probable than improbable
 - › In inductive arguments, there is no absolutely strong nor absolutely weak argument
 - › For instance, considering the above examples
 - ◆ Both arguments would be strengthened or weakened by the random selection of a larger or smaller sample
 - ◆ The incorporation of additional premises into inductive arguments will also generally tend to strength or weaken it
- › strength and weakness are only indirectly related to the truth values of their premises

- we **do not have to know** whether the **premise of an argument is actually true** in order to determine its strength (strong or weak)
- the **strength or weakness of an inductive argument results not from the actual truth or falsity of the premises and conclusion**, but from the **probabilistic support** the premises give to the conclusion
 - ✦ Nevertheless, there is **one arrangement of truth and falsity** in the premises and conclusion that **does determine the issue of strength**
 - ✓ Thus, any inductive argument having actually **true premises and an actually false conclusion is weak**

Strength and Truth Value

- There are four possibilities with respect to the truth or falsity of the premises and conclusion of a given argument:
 - True premises and True conclusion
 - True premises and False conclusion
 - False premises and True conclusion
 - False premises and False conclusion
 - ✦ **all of the above possibilities, except the second case** (true premises and false conclusion), **allow for both strong and weak arguments**
 - ✦ the **second case does not allow for strong arguments**
 - ✓ any argument having this combination is **necessarily weak**
- relationship between the strength of an inductive argument and the truth and falsity of its premises and conclusions summarized as follows

Premises	Conclusion	Strength
True	True	Strong/Weak
True	False	Weak
False	True	Strong/Weak
False	False	Strong/Weak

Induction and Cogency

- Depending on their **actual ability to accomplish their factual claims**, inductive arguments can be either cogent or uncogent
- ◆ **Cogent argument**
 - An inductive argument that is **strong** and has **all true premises**
 - **Both conditions must be met for an argument to be cogent**, and if either is missing the argument is uncogent

- Because the conclusion of a cogent argument is genuinely supported by true premises, it follows that **the conclusion of every cogent argument is probably true**
- A cogent argument is the inductive analogue of a sound deductive argument and is what is meant by a “good” inductive argument without qualification
- ◆ **Uncogent argument**
 - An inductive argument that is **either strong with one or more false premises, or weak, or both**
 - An inductive argument that **does not actually accomplish its inferential claim**, (that is not strong), **cannot be cogent**, regardless of the truth values of its premises

Note

- **There is a difference between sound and cogent arguments in regard to the true premise requirement**
 - **In a sound argument**, it is **only** necessary that the premises be true and nothing more
 - ✦ Given such **premises and good reasoning, a true conclusion is guaranteed**
 - **In a cogent argument**, on the other hand, the **premises must not only be true**, they must also **not ignore some important piece of evidence** that **outweighs the given evidence** and entails a quite different conclusion
 - ✦ **If the premises reflect all the important factors**, then the argument is **cogent**; **if not**, then obviously the argument is **not cogent**
 - ✦ Thus, for cogency, the premises must **not only be true** but also **not overlook some important factor** that outweighs the given evidence and requires a different conclusion

Key Points on Lesson 4: Evaluating Arguments

4.1 Evaluating Deductive Arguments: Validity, Truth, and Soundness

Deduction and Validity

◆ Valid deductive argument

- If the premises are assumed true, it is **impossible** for the conclusion to be false
- the **conclusion follows with strict necessity** from the premises

◆ Invalid deductive argument

- If the premises are assumed true, it is **possible** for the conclusion to be false
- the **conclusion does not follow with strict necessity** from the premises

Note

- **There is no middle ground between valid and invalid**
 - argument is **either valid or invalid**
- **There is only an indirect relation between validity and truth**
 - For an argument to be valid **it is not necessary** that either the premises or the conclusions **be true**

Validity and Truth Value

Four possibilities:

1. Possibility One | True premises and True conclusion (the first case)

- It **allows for both valid and invalid arguments**

2. Possibility Two | True premises and False conclusion (the second case)

- It **allows only for invalid arguments**
 - such combinations are **contrary to the inferential claim** of a deductive argument

3. Possibility Three | False premises and True conclusion (the third case)

- It **allows for both valid and invalid arguments**

4. Possibility Four | False premises and False conclusion (the fourth case)

- It **allows for both valid and invalid arguments**

Note

- The basic idea of evaluating deductive argument is not whether premises and conclusion are true or false (truth or falsity), but **whether the premises support the conclusion**
- Nevertheless, there is **one arrangement** of truth and falsity in the premises and conclusion that **does determine the issue of validity**

- Any deductive argument having **actually true premises and an actually false conclusion is invalid**

Relationship between the validity of a deductive argument

Premises	Conclusion	Validity
True	True	Valid/invalid
True	False	Invalid
False	True	Valid/invalid
False	False	Valid/invalid

Deduction and Soundness

- Depending on their actual **ability to accomplish their factual claims**, deductive arguments can be either sound or unsound
- ◆ **Sound argument** | Both **valid** and has **all true premises**
 - by definition, **Every sound argument will have a true conclusion**
- ◆ **Unsound argument** | Either **valid with one or more false premises**, or **invalid**, or **both**

4.2 Evaluating Inductive Arguments: Strength, Truth, and Cogency

Induction and Strength

- ◆ **Strong inductive argument**
 - If the **premises are assumed true**, it is **improbable for the conclusion to be false**
 - the conclusion **follows probably** from the premises
- ◆ **Weak inductive argument**
 - If the **premises are assumed true**, it is **probable for the conclusions to be false**
 - the **conclusion does not follow probably** from the premises

Note

- **Unlike the validity and invalidity of deductive arguments, the strength and weakness of inductive arguments admit certain form of degrees**
 - To be considered strong, an inductive argument must have a conclusion that is **more probable than improbable**
 - there is **no absolutely strong nor absolutely weak** argument
- **strength and weakness are only indirectly related to the truth values of their premises**
 - Strength or weakness results **not from the actual truth or falsity of the premises and conclusion**, but from the **probabilistic support** the premises give to the conclusion

- ✦ Nevertheless, there is **one arrangement of truth and falsity** in the premises and conclusion that **does determine the issue of strength**
 - ✓ Any inductive argument having actually **true premises** and an **actually false conclusion** is **weak**

Strength and Truth Value

- There are **four possibilities** with respect to the **truth or falsity** of the premises and conclusion of a given argument:
 - True premises and True conclusion
 - True premises and False conclusion
 - False premises and True conclusion
 - False premises and False conclusion
- **all of the above possibilities, except the second case** (true premises and false conclusion), **allow for both strong and weak arguments**
 - the **second case does not allow** for **strong arguments**
 - ✦ any argument having this combination is **necessarily weak**

Relationship between strength of an inductive argument:

Premises	Conclusion	Strength
True	True	Strong/Weak
True	False	Weak
False	True	Strong/Weak
False	False	Strong/Weak

Induction and Cogency

- Depending on their **actual ability to accomplish their factual claims**, inductive arguments can be either cogent or uncogent
 - ◆ **Cogent argument** | **Both strong** and has **all true premises**
 - ◆ **Uncogent argument** | **Either strong with one or more false premises, or weak, or both**

Note

- **Difference between sound and cogent arguments regarding true premise requirement**
 - In a **sound argument**, it is **only necessary** that the premises be true and nothing more
 - In a **cogent argument**, the premises must **not only be true**, they must also **not ignore some important piece of evidence** that **outweighs the given evidence**



University Exams

Lesson 4: Evaluating Arguments

Instruction: True/False

1. A sound argument could be sometimes invalid

✓ Answer: False

≡ Explanation: To be a sound argument a deductive argument have to both valid and has all true premises. A sound argument couldn't be invalid

📖 Module Reference: if a deductive argument actually maintained its inferential claim, (i.e., if it is valid), and its factual claim, (i.e., if all of its premises are true), then that particular deductive argument will be a sound argument – Module Page 38 Line 11

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2. A valid argument should not only be restricted as an argument with factually true premises and true conclusion

✓ Answer: True

≡ Explanation:

📖 Module Reference: the basic idea of evaluating deductive argument, validity (valid and invalid) is not something that is determined by the actual truth or falsity of the premises and conclusion ... The question is not whether premises and conclusion are true or false, but whether the premises support the conclusion – Module Page 77 Line 22

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Instruction: Multiple Choice

3. All Managers are journalists. All Journalists are lawyers. So, all lawyers are journalists. This argument is said to be:

A. Valid Categorical syllogism

B. Invalid Argument

C. Uncogent Syllogism

D. Cogent Syllogism

E. Valid hypothetical Syllogism

F. Invalid Disjunctive Syllogism

✓ Answer: B

≡ Explanation: This is invalid argument because the conclusion doesn't follow strictly from the premises. If we assume that the premises are true it is possible for the conclusion to be false

📖 Module Reference: an invalid deductive argument is an argument such that if the premises are assumed true, it is possible for the conclusion to be false – Module Page 74 Line 24

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4. No cat is a reptile owing to all cats are dogs and no dog is a reptile. What would be the proper name of this argument in terms of both inferential and factual claims?

A. Sound

B. Unsound

C. Valid

D. Invalid

E. Cogent

F. A and B

✓ Answer: B

≡ Explanation: This is a valid argument with false premises which is unsound argument as result. The statement "all cats are dogs" is false. Unsound argument is a deductive argument that is either valid with one or more false premises, or invalid, or both

📖 Module Reference: unsound argument is a deductive argument that is either valid with one or more false premises, or invalid, or both – Module Page 79 Line 3

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5. Yesterday I bought new jeans with a tag that reads, "Made in U.S.A", Thus, my new jeans were made in the U.S.A

A. Deductive, Uncogent

B. Inductive, Strong

C. Deductive, Unsound

D. Deductive, valid

E. Inductive, Weak

✓ Answer: B

≡ Explanation:

- ✓ This is one of the forms of inductive argument. This is an arguments based on sign that proceeds from the knowledge of a certain sign to the knowledge of a thing or situation that the sign symbolizes. As we see here based on the sign/symbol “Made in U.S.A” the arguer concluded that “the new jeans were made in the U.S.A”
- ✓ Second point is if it is strong or weak. In this case if the premises are assumed true, it is improbable for the conclusion to be false, thus it is a strong argument

📖 Module Reference:

- ✓ In general, inductive arguments are such that the content of the conclusion is in some way intended to “go beyond” the content of the premises ... Such an argument may take any of several forms: predictions about the future, arguments from analogy ... arguments based on signs, and causal inferences. Arguments based on sign: it is an argument that proceeds from the knowledge of a certain sign to the knowledge of a thing or situation that the sign symbolizes – Module Page 70 and 71
- ✓ Strong inductive argument is an argument such that if the premises are assumed true, it is improbable for the conclusion to be false – Module Page 79 Line 18

6. A cogent argument requires one of the following combinations:

A. Strength and Validity

B. Strength and Truth

C. Validity and truth

D. Soundness and Strength

E. All, but not “D”

F. None

✓ Answer: B

≡ Explanation: To be a cogent argument, an argument has to be first, strong in its inferential claim and second, it has to include all true premises which is an attribute of truth

📖 Module Reference: A cogent argument is an inductive argument that is strong and has all true premises – Module Page 83 Line 6

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7. If government imposes import restrictions, the price of automobiles will rise. Therefore, since the government will not impose import restrictions, it follows that the price of automobiles will not rise, this argument form is

A. Invalid

B. Valid

C. Sound

D. Cogent

✓ Answer: A

≡ Explanation: This is an invalid argument because the conclusion doesn't follow strictly from the premises. If we assume that the premises are true it is possible for the conclusion to be false

📖 Module Reference: an invalid deductive argument is an argument such that if the premises are assumed true, it is possible for the conclusion to be false – Module Page 74 Line 24

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Practice Questions

Lesson 4: Evaluating Arguments

Instruction: The following arguments are deductive. Determine whether each is valid or invalid, and note the relationship between your answer and the truth or falsity of the premises and conclusion. Finally, determine whether the argument is sound or unsound

1. Since Moby Dick was written by Shakespeare, and Moby Dick is a science fiction novel, it follows that Shakespeare wrote a science fiction novel

✓ Answer: Valid, unsound; false premises, false conclusion

2. The longest river in South America is the Amazon, and the Amazon flows through Brazil. Therefore, the longest river in South America flows through Brazil

✓ Answer: Valid, sound; true premises, true conclusion

3. All leopards with lungs are carnivores. Therefore, all leopards are carnivores

✓ Answer: Invalid, unsound; true premise, true conclusion

4. Every province in Canada has exactly one city as its capital. Therefore, since there are thirty provinces in Canada, there are thirty provincial capitals

✓ Answer: Valid, unsound; false premise, false conclusion

5. Since some fruits are green, and some fruits are apples, it follows that some fruits are green apples

✓ Answer: Invalid, unsound; true premises, true conclusion

Instruction: The following arguments are inductive. Determine whether each is strong or weak, and note the relationship between your answer and the truth or falsity of the premise(s) and conclusion. Then determine whether each argument is cogent or uncogent

6. The grave marker at Arlington National Cemetery says that John F. Kennedy is buried there. It must be the case that Kennedy really is buried in that cemetery

✓ Answer: Strong, cogent; true premise, probably true conclusion.

7. Franklin Delano Roosevelt said that we have nothing to fear but fear itself. Therefore, women have no reason to fear serial rapists

✓ Answer: Weak, uncogent; true premise, probably false conclusion

8. People have been listening to rock and roll music for over a hundred years. Probably people will still be listening to it a year from now

✓ Answer: Strong, uncogent; false premise, probably true conclusion

9. Coca-Cola is an extremely popular soft drink. Therefore, probably someone, somewhere, is drinking a Coke right this minute

✓ Answer: Strong, cogent; true premise, probably true conclusion

10. The African American athlete Adrian Peterson is able to withstand tremendous impacts on the football field. However, Serena Williams, like Adrian Peterson, is a great African American athlete. Therefore, Serena Williams should be able to withstand tremendous impacts on the football field

✓ Answer: Weak, uncogent; true premises, probably false conclusion

Instruction: Determine whether the following arguments are inductive or deductive. If an argument is inductive, determine whether it is strong or weak. If it is deductive, determine whether it is valid or invalid

11. Since Tom is the brother of Agatha, and Agatha is the mother of Raquel, it follows that Tom is the uncle of Raquel

✓ Answer: Deductive, valid

12. Since Christmas is always on a Thursday, it follows that the day after Christmas is always a Friday

✓ Answer: Deductive, valid

13. After taking LSD, Alice said she saw a flying saucer land in the shopping center parking lot. Since Alice has a reputation for always telling the truth, we must conclude that a flying saucer really did land there

✓ Answer: Inductive, weak

14. Circle A has exactly twice the diameter of circle B. From this we may conclude that circle A has exactly twice the area of circle B

✓ Answer: Deductive, invalid

15. This cash register drawer contains over 100 coins. Three coins selected at random were found to have dates earlier than 1960. Therefore, probably all of the coins in the drawer have dates earlier than 1960

✓ Answer: Inductive, weak

16. Since $x + y = 10$, and $x = 7$, it follows that $y = 4$

✓ Answer: Deductive, invalid

17. Statistics reveal that 86 percent of those who receive flu shots do not get the flu. Jack received a flu shot one month ago. Therefore, he should be immune, even though the flu is going around now

✓ Answer: Inductive, strong