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MOTTO: BRINGING KNOWLEDGE TO YOUR DOORSTEP

TEL: 07037507487, 09094642770,07037302585

MAINLAND LECTURE CENTER

MTH211: SET THEORY AND ABSTRACT ALGEBRA

the term_____is used to describe any **well defined** collection of objects
set

If S is set, an object a in the collection S is called an_____of S.
Element

A set with no element in it is called the_____set
Empty

An empty set is denoted by _____
Φ

The two ways in describing a non-empty set is _____
Roster method and set builder method

Consider the sets A = {1, 2, 3} and B = {2, 3, 4}.find the set difference A/B and B/A
1 and 4

A x B, of the sets A and B, is the set of all possible ordered pairs (a, b), where a .Bb,A∈∈ Is called

The Cartesian product

if A = {1, 2,2 3} and B = {4, 6}, then A X Bis _____
{ (1, 4), (1, 6), (2, 4), (2, 6), (3, 4), (3, 6)}

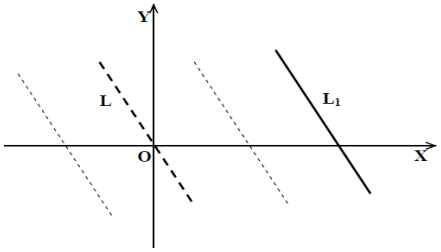
If A = {2, 5} B = {2, 3}, find A x B, B x A and A x A.
AXB is (2,2),(2,3),(5,2),(5,3) BXA is (2,2),(2,5),(3,2),(3,5) AXA is (2,2)(2,5)(5,2),(5,5)

A_____R defined on a set S is a subset of S x S.
Relation

if we have ,the relation R is said to be _____
reflexive

if aRb the relation R is said to be
symmetric

if aRb and bRc the relation R is said to be
transitive



This Is called _____
The equivalence class of L1

The range of f is a subset of B, i.e., f(A) ⊆B. B iscalled the_____of F.
Codomain

A function f: A → B is called **one-one** (or **injective**)if _____
F associates different elements of A with different elements of B

the function π1: A x B → A: π1 ((a, b)) = a. π1 iscalled the_____of A x B onto A.
projection

If a function is both one-one and onto, it is called _____
bijective, or a **bijection**

Let A be any set. The function IA: A → A: IA(a) = a is called the _____ on A.
identity function

If f: A → B is a bijection, then we also say that the sets A and Bare _____
Equivalent

Let f: **R** → **R** and g: **R** → **R** be defined by f(x) = x2 and g(x) = x + 1. What is g f? □
g f□x) = g(f(x)) = f(x) + 1 = x2 + 1.

Let f: **R** → **R** and g: **R** → **R** be defined by f(x) = x2 and g(x) = x + 1.What is f g? □
f g□x) = f(g(x)) = (g(x))2 = (x + 1)2.

Let S be a non-empty subset of **Z**. An element a ∈S is called a_____of S if a ≤ b **V** x∈ S.
least element (or a **minimum element**)

Let a, b ∈**Z**. c ∈ **Z** is called a_____of a and b if c | a and c | b.
common divisor

In the expression, a = qb + r, 0 ≤ r < b, r is called the_____
Remainder

If (a, b) = 1, then the two integers a and b are saidto be_____to each other
relatively prime (or co prime)

A natural number p (≠ 1) is called a_____if its only divisors are 1 and p
Prime

If a natural number n (≠ 1) is not a prime, then it is called a _____
composite number

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If ? and * are two binary operations on a set S, we say that * is _____ ?
distributive over

Let * be a binary operation on a set S. If there is an element e ∈ S such that **V** a ∈S, a *e= a and e*a = a, then e is called **an**_____for *
identity element

(G, *) is a group it is sufficient to show that * satisfies the following axioms.
G1') * is associative.
G2') ∃ e ∈ Gsuch that e * a=aVa∈G G3")
Given a∈G∃b∈G such that b *a = e.

If (G, *) is a group, where G is a finite set consisting of n elements, then we say that (G, *) is a _____**of order n**.
finite group

If G is an infinite set, then we say that (G, *) is **an** _____
infinite group

If * is a commutative binary operation we say that (G, *) isa _____
commutative group, or an **abelian group**

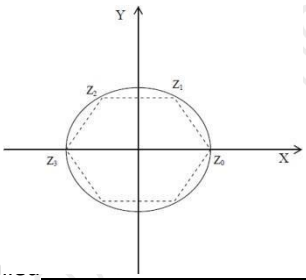
ab = ac ⇒ b = c. This is known as the _____
left cancellation law

ba = ca ⇒ b = c. This is known as the _____
right cancellation law

For a complex number z = x + iy, the complex number x + i (-y) iscalled the_____of z
Conjugate

Let (G,*) be a group. A non-empty subset H of G iscalled a_____of G
Subgroup

a subgroup of an abelian group is _____
abelian.



is ca_____
Roots of Unity

If S is a subset of a group G, then the smallest subgroup of G containing S is called **the subgroup** generated by the set S, and is 'written as_____
<S>

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A group G is called a_____if G = < {a} > for some a ∈G.
cyclic group

Any subgroup of a cyclic group is _____
Cyclic

Which of the following is divisible by 17 for all positive integer n
3.5^{2n+1}+2^{3n+1}

A matrix $$ X=\bigl(\begin{pmatrix} 3 & 1\\ 5 & 2\end{pmatrix}\bigr)$$ define a function from $$\mathbb{R}^{2}\; to\;\mathbb{R}^{2} $$ by $$f_{X}(a,b)=(3a+b,\; 5a+2b)$$. find the inverse function of $$f_{X}$$
f^{1}_{X}(a,b)=(2a-b,\; -5a+3b)

Find all the real number that satisfy the inequality $$ 1/x < x^{2}
left \{x: x < 0 \; or \; x > 1 \right \}

If H is a group and x and y belongs to H such that xy=yx, given that the order of x is m, the order of y is n, and (m,n)= 1, what is the order of xy?
Mn

What is the generator of (Z, +) cyclic group?
1

If G is a cyclic group of order 4 generated by a, and let $$H= <a^{2}>$$
{e, a^2} \; and \; {a, a^3 }

Find all x in Z satisfying the equation 5x=1 (mod 6)
{1,5,11, ...}

What is addition of 3 and 5 under modulo 7
1

What is 3 multiply by 4 under modulo 12
0

Which of the following multiplication tables defined on the set G = {a,b,c,d} form a group? <grp1>
(i)Not a group (ii) A group

Which of the following is divisible by 17 for all positive integer n
3.5^{2n+1}+2^{3n+1}

A matrix $$ X=\bigl(\begin{pmatrix} 3 & 1\\ 5 & 2\end{pmatrix}\bigr)$$ define a function from $$\mathbb{R}^{2}\; to\;\mathbb{R}^{2} $$ by $$f_{X}(a,b)=(3a+b,\; 5a+2b)$$. find the inverse function of $$f_{X}
F^{1}_{X}(a,b)=(2a-b,\; -5a+3b)

Given a set $$X=\left \{ a,b,c \right \}$$, and a function $$\Psi :X\; \rightarrow \; X $$ define by $$\Psi(a)=b,\; \Psi (b)=a,\; \Psi (c)=c $$. the function is
Bijective

Which of the following pair of functions has f o g = g o f
f(y)=y^{2} \; and \; g(y)=3y+7

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Four relations a to d are defined on sets A and B as in the diagram shown. Which of the relations represent a function from A to B?
f1 and f2

For sets A and B , if A and B are subset of Z (the set of Integer) which of the following relations between the two subset is true?
(A\B)n(B\A)= 0

If R (the set of real number) be the universal set and sets $$V=\left \{ y\epsilon R:0 < y\leq 3 \right \}$$ and $$W=\left \{ y\epsilon R:2\leq y < 4 \right \}$$ What is $$V^{l}$$
\left \{ y\epsilon R:0\leq y \; or\; y> 3 \right \}

Let R be the universal set and suppose that $$X=\left \{ y\epsilon R:0 < y\leq 7 \right \}$$ and $$Y=\left \{ y\epsilon R:6\leq y < 12 \right \}$$ find X\Y
\left \{ y\epsilon R:2 < y < 6 \right \}

Consider a relation * defined on $$(a,b),\; (c,d)\; \epsilon \; \Re ^{2}$$ by $$(a,b)\;* (c,d)\; $$ to mean $$2a-b = 2c-d $$ which of the following is true about *
Is reflexive, symmetric and transitive

Four sets X, Y, V and W has u, 7, h and 20 elements respectively, how many elements has the Cartesian product (Y x V x W) formed from the sets Y, V and W
140h

A matrix $$ X=\begin{pmatrix} 1 &2 \\ 2& 5 \end{pmatrix}$$ define a function from $$\mathbb{R}^{2}\; to\;\mathbb{R}^{2} $$ by $$f_{X}(a,b)=(3a+b,\; 5a+2b)$$. find the inverse function of $$f_{X} **f^{1}_{X}(a,b)=(2a-b,\; -5a+3b)**

Find all x in Z satisfying the equation 5x=1 (mod 6)
\left \{1,5,11,…… \right \}

What is addition of 3 and 5 under modulo 7
1

What is 3 multiply by 4 under modulo 12
0

For sets A and B , if A and B are subset of Z (the set of Integer) which of the following relations between the two subset is true?
(A\B)n(B\A)= empty set

If R (the set of real number) be the universal set and sets $$V=\left \{ y\epsilon R:0 < y\leq 3 \right \}$$ and $$W=\left \{ y\epsilon R:2\leq y < 4 \right \}$$ What is $$V^{l}$$
left \{ y\epsilon R:0\leq y \; or\; y> 3 \right \}

Let R be the universal set and suppose that $$X=\left \{ y\epsilon R:0 < y\leq 7 \right \}$$ and $$Y=\left \{ y\epsilon R:6\leq y < 12 \right \}
\left \{ y\epsilon R:2 < y < 6 \right \}

Which of the following pair of functions has f o g = g o f
f(y)=y^{2} \; and \; g(y)=3y+7$$

Four relations a to d are defined on sets A and B as in the diagram shown. Which of the relations represent a function from A to B?
f1 and f2

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Find the order of element -1 in the multiplicative group $$\left\{1,-1,- i, (-i) \right\}
2

Which of the following is/are true about a group G. (i) The order of an element a in G is the least positive integer n such that $$a^{n} = e$$. (ii) if such integer does not exist then the order of a is greater than one or infinite (iii) The order of an element a in G is the least positive integer n such that $$a^{e} = n
(i) and (ii)

The assertion that if H is a subgroup of a finite group G, then the order of H divides the order of G is called_
Lagrange's theorem

Find all the real number that satisfy the inequality $$1 < x^{2} < 4$$
\left \{x:1 < x < 2 \; or \; -2 < x < -1\right \}

Given that x, y, z be any elements of $$\mathbb{R}, which of the following statement is/are true? (i) if x > y and y > z, then x > z (ii) if x > y then x + z < y + z (iii) if x > y and z > 0, then zx > zy
(i)and (iii)

Let G be a non Ð´ÑƒÑ• empty set and be a binary operation on G. We say that the pair (G, *) is a non

Ð´ÑƒÑ• abelian group if which of the following is not part of it

Every element in G has an inverse in G with respect to \(ast\)
If \((G,\ast)\) is a group where G is a finite set consisting of n elements, then we say that \((G,\ast)\) is
Abelian group

Let G be a group, then \((ab)^{-1}\) is equal to
\(\frac{1}{ab}\)

The value of \((13)\bullet (12)\) in \(S_{3}\) is
\((12)\)

In a permutation group, any cycle of length two is called
Negation

Let \(P\) be a subset of \(N\). If \(P\) satisfies \(IB\) and \(I\delta\) where \((IB) I\in P\), \((IS)\) for every\(i\in p\), we know that (\(i+1\) is also in P; then
\(P=N\)

Let \(S\) and \(T\) be two sets. Then Cartesian product of \(S\) and \(T\) is the set
\(S\times T={(s,t):, s\in T, t\in s}\)

The center of a group \(G\) denoted by \(Z(G)\) is the set
\(Z(G)={g\in G|xg=gx, \forall x\in G}\)

Find the inverse \([(12)\bullet (132)]^{-1}\)
\((23)\)

In a complex numbers an argument of \(Z_{1} Z_{2}\) is
An argument of \(Z_{1}\)- an argument of \(Z_{2}\)

Which of the following is not the property of\((H,\ast)\)to be a subgroup of \((G,\ast)\)
\(a\in H\Rightarrow a^{-} \in H\)

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Let\(H\) be a subgroup of a group G, and let \(x\in G\). we call the set \({ \frac{hx}{ h}\in H\)
A right coset of \(H\) in \(G\)

Let \(H\) be a subgroup of a finite group \(G\). We call the number of distinct of \(H\) in \(G\) is
index
The order of an element is
The least positive integer n such that\(g^{n} = e\)

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index

The order of an element is
The least positive integer n such that\(g^{n} = e\)

A group homomorphism that is injective and also surjective is called
Isomorphism

The order of \((12)\) in \(S_{3}\) is
1

. Let \(H = \{I, (1, 2)\}\) be a subgroup of \(S_{3}\). The distinct left cosets of \(H\) in \(S_{3}\)are
H, (123)H, (12)H

Let \(G\) be a group. If there exist \(g\in G\) has the form \(x = g^{n}\) for some \(n\in Z\) then \(G\) is
A cyclic group

A function \(f : A\rightarrow B\) is called one Ð´ÑƒÑ• one if and only if different element of B. some time is called
Bijective

Let \(H = 4Z\). How many distinct right coset of \(H\) in \(Z\) do we have
2

ÐŠÐ¶ Which of the following is not a properties of an equivalence relation?
Anti Ð´ÑƒÑ• symmetric

Let A and B be two sets and : \(A\rightarrow B\) be a function. Then for any subset \(S\)of \(B\) the inverse image of \(S\)under \(f\) is the set
None of the option

Let \(Ð•Ð•: R\rightarrow R\) and \(g: R\rightarrow R \)be defined by\(f(x) = x^{2}\) and \(g(x) = 1 + x\) find \(g\cdot f\)
\(x^{2}+1\)

Consider the function \(Ð•Ð•: R\rightarrow R\)define by \(f(x) = x +3\). If we define \(g: R\rightarrow R\) by \(g(x) = x Ð´ÑƒÑ• 3\), then \(f\cdot g(x)\) is
\(x\)

let \(a, b\epsilon Z, b > 0\), then there exist a unique integers\(q,r \)such that \(a = qb + r \)where \(0 \leq r < b\). then r is called the

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none of the option

If \((a, b) = 1\) then the two integers \(a\) and \(b\)are said to be
none of the option

We can say that a and b are coprime to each other if and only if there exists \(m, n Ð´Ñ™Ñ™ Z\) such that
\(\frac{ma}{nb}\)

In the division algorithm given by \(n = qd + r\), then \(n\) is called
Divisor

If \(\rho\) is a collection of subsets of a set \(S\), then we can define the union of all members of \(\rho\) by
\(\cap_{A\epsilon\rho} A ={x\epsilon A for some A\epsilon \rho\)

Which of the following denote the intersection of A and B?
\(A\cup B={x\in S|x\in A and x\in B\)

ĐŠĐ¶ Which of the following is not a properties of an equivalence relation?
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\(x\)

let \(a, b\epsilon Z, b > 0\), then there exist a unique integers\(q,r \)such that \(a = qb + r \)where \(0 \leq r < b\). then r is called the
none of the option

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Let G = {1, -1, i, -i}. Then G is a group under usual multiplication of complex numbers, in this group, the order of i is _____.

4

The order of (12) in is_____.

2

In a permutation, any cycle of length two is called _____.

Transposition

A field K is called_____of F if F is a subfield of K, thus Q is a subfield of R and R is afield extension of Q

Field extension

We call an integral domain R a_____if every non – zero element of R which is not a unit in R can be uniquely expressed as a product of a finite number of irreducible elements of R

Unique factorization domain

Given two elements a and b in a ring R, we say that c is a_____of a and b if c|a and c|b.

Common divisor

We call an integral domain R a_____if every ideal in R is a principal ideal.

Principal ideal

Let R be an integral domain, an element a R is called a unitor an_____in R if we can find bR such that ab = 1 i.e if a has a multiplicative inverse

Invertible element

A domain on which we can define a Euclidean valuation is called _____.

Euclidean domain

Let F be a field and f(x) Fx we say that an element a Fis a_____(or zero) of f(x) if f(a) = 0

Factor

If S is set, an object 'a' in the collection S iscalled an _____of S

Element

A set with_____element in S is called an empty set

No

_____ method is sometimes used to list the element of a largeset

Roster

The set of rational numbers and the set of real numbers are respectively represented bythe symbol _____and_____.

Q and R

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The symboldenotes_____.
There exist

If A and B are two subsets of a set S, we can collect the element that are common to both A and B, we call this set the_____of A and B.
Intersection

A relation R defined on a set S is said to be_____if we have
Reflexive

A relation R defined on a set S is said to be_____if
Symmetric

A relation R defined on a set S is said to be_____if a R b and
Transitive

A relation R defined on a set S that is reflexive, symmetric and transitive is called _____ relation
Equivalence

A_____f from a non – empty set A to a non – empty set B is a rule which associateswith every element of A exactly on element of B
Function

A function is called_____if associates different elements of A with different element of B
Injective

A function is called_____if the range of f is B.
Onto

A function that is both one to one and onto is called _____
Bijective

A set that is not_____is called infinite set
Finite

1 and p
Prime

_____number
Composite

_____on A.
Identity function

_____on S.
Binary operation

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The Cayley table is named after the famous mathemathecian
Arthur Cayley

_____system consists of a set with a binary operation which satisfies certain properties is called a group
Algebraic

is an equivalence relation, and hence partition Z into disjoint equivalenceclasses called _____ modulo n.
Congruence class

If the set X is finite, say X = (1,2,3, …, n) then we denote S(x) by and each of is called a_____ on n symbols
Permutation

In a principle ideal Domain an element is prime if and only if it is
Reducible

Express x4+ x3+5x2-x as (x2 +x+1)+rx in Q[x]
None of the options

Let F be a field. Let f(x) and g(x) be two polynomials in F[x] with g(x) ≠0. Then I There exist two polynomial q(x) and r(x) in F[x] such that f(x) = q(x)g(x) + r(x), where degr(x) < degg(x).IIThe polynomial q(x) and r(x) are unique, which of the following is a properties of Division Algorithm
I only

Which of the following polynomial ring is free from zero divisor
Z6

Let R be a ring and f(x) and g(x) be two non – zero element of R[x]. Then deg(f(x)g(x)) ≤ degf(x) + degg(x) with equality if
R does not have a zero divisor

If p(x), q(x) ∈ Z[x] then the deg(p(x).q(x)) is
Max (deg p(x), deg q(x))

If f(x) = a0+a1x+…+anxn and g(x) = b0+b1x+…+bmxm are two polynomial in R[x], we define their product f(x).g(x) = c0+c1x+…+cm+nxm+1 where ci is
ai bi ∀ i = 0,1, …, m+n

Consider the two polynomials p(x), q(x) in Z[x] by p(x)= 1+2x+3x2, q(x) = 4+5x+7x3. Then p(x) + q(x) is
5+7x+3x2+7x3

Determine the degree and the leading coefficient of the polynomial 1+x3+x4+0.x5 is
(3,1)

The Degree of a polynomial written in this form deg(∑i=0naixi) if an ≠0 is
0

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Let R be a domain and x ∈ R be nilpotent then xn = 0 for some n ∈ N. Since R has no zero divisors this implies that
x = 1

An ideal m Z of Z is maximal if and only if m is
An even number

Every maximal ideal of a ring with identity is
A field

Let R be a ring with identity. An ideal M in R is Maximal if and only if R/M is
A field

An ideal p of a ring R with identity is a prime ideal of R if and only if the quotient ring is
An integral domain

The characteristics of a field is either
None of the options

Zn is a field if and only if
n is an even number

Which of the following is an axioms of a field
Is commutative

Let R be a ring, the least positive integer n such that nx = 0 ∀ x ∈ R is called
The order of R

Which of the following is not a property of an integral domain
Is a commutative ring

A non – zero element in a ring R is called zero divisor in R if there exist a non – zero element b in R such that
ab = 0

If H is a subgroup of a group G and a, b ∈ G then which of the following statement is true
Ha = H Iff   a∈ H

Let G be a group and a∈G such that O(G) = t, then an= am, if and only if
None of the options

Which of these does not hold for '×' distributive over , and ' –
A× (BC) = A×B A×C

The symmetric difference of two given sets A and B, denoted by A Δ B is defined by
A Δ B = (A – B) or (B – A)

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The (relative) complement (or difference) of a set A with respect to a set B denoted by B – A (or B\A) is the set
B – A = {x B :x∈A}

Which of the following is of the operations and
Associative A(BC) = (AB) C and A(BC) = (AB)C for three sets A,B,C

The intersection of two sets A and B written as AB is
The set AB = {x:x∈A and x∈B}

A set X of n elements has
2n subsets

If G is a finite group such that O(G) is neither I nor a prime, then G has
Non – trivial proper subgroup

Which of the following is not the definition of Euler Phi – function MCQ39: Every group of prime order is
Non – abelian

An element is of infinite order if and only if all its power are
Real

Consider the following set of 8 2 ´ 2 matrices over ¢. Q8 = {±I, ±A, ±B, ±C} where I = , A = , B = , C = and i = -1. If H = <A> is a subgroup, how many distinct right cosets does it have in Q8
8

Let H = 4Z. How many distinct right coset of H in Z do we have?
2

A function f : A B is called one – one if and only if different element of B. some time is called
Bijective

Let G be a group, g ∈ G and m, n ∈ Z. which of the following does not hold
(gm)n = gmn

Let G be a group. If there exist g ∈ G has the form x = gn for some n ∈ Z then G is
A cyclic group

Let H = {I, (1, 2)} be a subgroup of S3. The distinct left cosets of H in S3are
H, (123)H, (12)H

The order of in Q8 is
4

The order of (12) in S3 is
1

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A group generated by g is given by <g> = {e, g, g2, …,gm-1} the order of g is
0

Let H be a subgroup of a finite group G. We call the number of distinct of H in G_____.
index

A non-zero element in a ring R is called a_____in R if there exists a non-zero element b in R such that ab = 0
zero divisor

We call a non-zero ring R an integral domain if has_____
i) R is with identity and
ii) R has no Zero divisors.

A ring (r, +.,) is called a_____if (R\{0}.,) is an abelian group
Field

A ring homeomorphisms from one field to another is called_____
field homeomorphisms

A proper ideal P of a ring R is called a_____of R
prime ideal

An ideal P of a ring R with identity is a prime ideal of R if and only if the quotient ring R/P is an _____
integral domain.

A non-zero element p of an integral domain R is called a prime element if
i) p does not have a multiplicative inverse, and
ii) whenever a, b ∈ R and p | ab, then p | a or p | b.

A non-empty subset S of a field F is caned a_____of F
subfield

If S ≠F, then S is called a_____of F
proper subfield

A field K is called a_____of F if F is a subfield of K
field extension

_____is used to determine the number of elements in a set
cardinality

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then A?B = _____
A

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then AnB = _____
B

_____is the set that helps to identify the number of possible subsets that can be generated from a given set
power

The sets that can be generated from the universal set are called _____
subsets

The form of set that involve using signs, symbols, letters, alphabets to describe the elements in a set is called
_____

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builders form

Listing exhaustively the elements in a set is known as set_____form
Abular
The collection of a well- defined object is _____
set

_____is used to determine the number of elements in a set
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If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then A?B = _____
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B

_____is the set that helps to identify the number of possible subsets that can be generated from a given set
power

A set that contains only one element is called_____set
singleton

The sets that can be generated from the universal set are called _____
subsets

The universal set is also known as _____
parent

The form of set that involve using signs, symbols, letters, alphabets to describe the elements in a set is called _____
builders form

Listing exhaustively the elements in a set is known as set_____form
abular

The collection of a well- defined object is _____
set

_____is used to determine the number of elements in a set
cardinality

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Power

A set that contains only one element is called_____set
Singleton

The sets that can be generated from the universal set are called _____
Subsets

The universal set is also known as _____
parent

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The form of set that involve using signs, symbols, letters, alphabets to describe the elements in a set is called _____
builders form

Listing exhaustively the elements in a set is known as set_____form
abular

The collection of a well- defined object is _____
Set

If Q is the set of all rational numbers and R is the relation 'is greater than', then 3 R 2 is a …… defined on Q.
relation

A_____\(R\) defined on a set S is a subset of \(S\times S\)
Relation

If A = {1, 2,2 3} and B = {4, 6}, then \(A \times B\) = _____
{ (1, 4), (1, 6), (2, 4), (2, 6), (3, 4), (3, 6)}

The Cartesian product \(A\times B\)of the sets A and B is the set of ……. possible ordered pairs, where \(a\epsilon A, b\epsilon B\)
all

Let A and B be two sets. Consider the pair (a, b), in which the first element is from A and the second from B. Then (a, b) is called an _____
nested pair

When the intersection of two sets is \(\phi\), we say that the two sets are mutually _____
disjoint

The_____of set A and B is the set of those elements of S which are common in A and B.
Intersection

The_____of set A and B is the set of those elements of S which are in A or in B.
union

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then n(A∪B)
10

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then n(A∩B) = _____
5

_____is used to determine the number of elements in a set
Cardinality

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then A∪B = _____
A

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then A∩B = _____
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5

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then A∪B = _____
A

If A = {1,2,3,…,10} and B = {2, 4, 6, 8, 10}, then A∩B = _____
B

Let R be an integral domain. We say that an element x ∈ R is irreducible if
(I) x is not a unit
(II) If x = ab with a,b ∈ R then a is a unit or b is a unit.
Which of the following is the definition of irreducible element
I only

In Qx find the g.c.d of p(x) = x2+3x-10 and q(x) = 6x2-10x-4
3x+1

An element d ∈ R is a greatest common divisor of a,b ∈ R if
I d/a and d/b
II For any common divisor c of a and b, c/d which of the following is a properties of greatest common divisor
II only

Let R be an integral domain. We say that a function d: R\{0} N ∪ {0} is a Euclidean valuation on R if which of the

following conditions are satisfied:
I d(a) ≤ d(ab) ∀ a,b ∈ R\{0}
II for any a,b ∈ R, b ≠ 0 ∃ q, r ∈ R such that a = bq + r where r = 0 or d(r) < d(b)
II only

Let p be a prime number consider xp-1-T∈ ZP [x]. Use the fact that ZP is a group of order p. show that every non – zero element of ZP is a root of xp-1-T. In particular if p = 3
x3-1-T = (x – T)(x –)

In the given polynomial f(x) = x-32(x+2), 3 is a root of multiplicity
1

Let F be a field and f(x) ∈ F[x]. We say that an element a∈F is a root of f(x) if
f(a) = 1

Express x4+ x3+5x2-x as (x2 +x+1)+rx in Q[x]
None of the option

Let F be a field. Let f(x) and g(x) be two polynomials in F[x] with g(x) ≠0. Then
I There exist two polynomial q(x) and r(x) in F[x] such that f(x) = q(x)g(x) + r(x), where degr(x) < degg(x).
IIThe polynomial q(x) and r(x) are unique, which of the following is a properties of Division Algorithm
I only

Which of the following polynomial ring is free from zero divisor
Z6

Let R be a ring and f(x) and g(x) be two non – zero element of R[x]. Then deg(f(x)g(x)) ≤ degf(x) + degg(x) with equality if
R does not have a zero divisor

If p(x), q(x) ∈ Z[x] then the deg(p(x).q(x)) is
Max (deg p(x), deg q(x))

If f(x) = a0+a1x+…+anxn and g(x) = b0+b1x+…+bmxm are two polynomial in R[x], we define their product f(x).g(x) = c0+c1x+…+cm+nxm+1 where ci is
ai bi ∀ i = 0,1, …, m+n

Consider the two polynomials p(x), q(x) in Z[x] by p(x) = 1+2x+3x2, q(x) = 4+5x+7x3. Then p(x) + q(x) is
5+7x+3x2+7x3

Determine the degree and the leading coefficient of the polynomial 1+x3+x4+0.x5 is
(3,1)

The Degree of a polynomial written in this form deg(∑i=0naixi) if an ≠0 is
0

Let R be a domain and x ∈ R be nilpotent then xn = 0 for some n ∈ N. Since R has no zero divisors this implies that
x = 1

An ideal m Z of Z is maximal if and only if m is
An even number

Every maximal ideal of a ring with identity is

A field

Let R be a ring with identity. An ideal M in R is Maximal if and only if R/M is
A field

An ideal p of a ring R with identity is a prime ideal of R if and only if the quotient ring
An integral domain

The characteristics of a field is either
None of the option

Zn is a field if and only if
n is an even number

Which of the following is an axioms of a field
Is commutative

Let R be a ring, the least positive integer n such that nx = 0 ∀ x ∈ R is called
The order of R

Which of the following is not a property of an integral domain
Is a commutative ring

A non – zero element in a ring R is called zero divisor in R if there exist a non – zero element b in R such that
ab = 0

If H is a subgroup of a group G and a, b ∈ G then which of the following statement is true?
Ha = H Iff a ∈ H

Let G be a group and a∈G such that O(G) = t, then an= am, if and only if
None of the option

Which of these does not hold for '×' distributive over∪, ∩ and ' –

A× (B∪C) = A×B ∪ A×C

The symmetric difference of two given sets A and B, denoted by A Δ B is defined by
A Δ B = (A – B) or (B – A)

The (relative) complement (or difference) of a set A with respect to a set B denoted by B – A (or B\A) is the set
B – A = {x B :x∈A}

Which of the following is of the operations ∪and ∩
Associative A ∪ (B ∪C) = (A ∪B) ∪C and A∩ (B∩C) = (A∩B) ∩ C for three sets A,B,C

The intersection of two sets A and B written as A∩B is
The set A∩B = {x:x∈A and x∈B}

A set X of n elements has
2n subsets

If G is a finite group such that O(G) is neither I nor a prime, then G has
Non – trivial proper subgroup

Which of the following is not the definition of Euler Phi – function φ :N ⟶ N
φ (i=1(

Every group of prime order is
Non – abelian

An element is of infinite order if and only if all its power are
Real

Consider the following set of 8 2 ´ 2 matrices over ¢. Q8 = {±I, ±A, ±B, ±C}

where I = 1001, A = 01-10, B =0i0-i, C = i00-i and i = -1. If H = <A> is a subgroup, how many distinct right cosets does it have in Q8
8

Let H = 4Z. How many distinct right coset of H in Z do we have?
2

A function f : A ⟶B is called one – one if and only if different element of B. some time is called
Bijective

Let G be a group, g ∈ G and m, n ∈ Z. which of the following does not hold
(gm)n = gmn

Let G be a group. If there exist g ∈ G has the form x = gn for some n ∈ Z then G is
A cyclic group

Let H = {I, (1, 2)} be a subgroup of S3. The distinct left cosets of H in S3are
H, (123)H, (12)H

The order of 01-10 in Q8 is
4

The order of (12) in S3 is
1

A group generated by g is given by <g> = {e, g, g2, …,gm-1} the order of g is
0

Let H be a subgroup of a finite group G. We call the number of distinct of H in G is
index
Let G = {1, -1, i, -i}. Then G is a group under usual multiplication of complex numbers, in this group, the order of i is _____.
4

The degree and the leading coefficient of the polynomial 1 + x3+x4+0.x5is _____.
(4,1)

The degree of a polynomial written in this form (∑i=0naixi) if an≠0 is_____.
n

The order of (12) in S3is _____.

2

In a permutation, any cycle of length two is called _____.
Transposition

A field K is called _____ of F if F is a subfield of K, thus Q is a subfield of R and R is a field extension of Q
Field extention

A non – empty subset S of a field F is called a subfield of F if it is a field with respect to the operations on F. if S ≠F, then S is called _____ of F
Proper subfield

Let f(x) = a0+a1x+…anxn∈Zx. We define the content of fx to be the g.c.d of the integers a0,a1,…,an, we say f(x) is _____ if the content of f(x) = 1
primitive

We call an integral domain R a _____ if every non – zero element of R which is not a unit in R can be uniquely expressed as a product of a finite number of irreducible elements of R
Unique factorization domain

An element d ∈ R is a _____ of a, b ∈ R if d|a and d|b and (i)i for any common divisor c of a and b, c|d
Greatest Common divisor

Given two elements a and b in a ring R, we say that c ∈ R is a _____ of a and b if c|a and c|b.
Common divisor

We call an integral domain R a _____ if every ideal in R is a principal ideal.
Principal ideal

The number of unit that can be obtained in R = a+b-5 |a,b ∈Z is _____
2

Let R be an integral domain, an element a ∈ R is called a unit or an _____ in R if we can find b∈R such that ab = 1 i.e if a has a multiplicative inverse
Invertible element

A domain on which we can define a Euclidean valuation is called _____.
Euclidean domain

Let R be an integral domain. We say that a function d:R0 → N ∪ 0 is a _____ on R if the following conditions are satisfied.

d(a) ≤d ∀ a,b ∈R0 and for any a,b ∈R, b ≠0 ∃ q,r∈R such that a=bq.r, where r=0 or dr<db.
Euclidean Evaluation

Let F be a field and f(x) ∈ Fx, we say that an element a∈ F is a _____ (where) m is positive integer of f(x) if (x-a)m|f(x) but (x-a)m+1×f1
Root of multiplicity m

Let F be a field and f(x) ∈ Fx we say that an element a ∈ F is a _____ (or zero) of f(x) if f(a) = 0
Factor

If S is set, an object 'a' in the collection S is called an_____ of S

Element

A set with _____element in S is called an empty set
No

_____ method is sometimes used to list the element of a large set
Roster

The symbol ∃ denotes _____.
There exist

If A and B are two subsets of a set S, we can collect the element that are common to both A and B, we call this set the _____of A and B.
Intersection

A relation R defined on a set S is said to be _____ if we have aRa ∀ a ∈S.
Reflexive

A relation R defined on a set S is said to be _____if
a R b ⇒ b R a ∀ a,b ∈ S.
Symmetric

A relation R defined on a set S is said to be _____ if a R b and b R a ∀ a,b,c∈ S
Transitive

A relation R defined on a set S that is reflexive, symmetric and transitive is called _____ relation
Equivalence

A _____ f from a non – empty set A to a non – empty set B is a rule which associates with every element of A exactly on element of B
Function

A function f : A → B is called _____ if associates different elements of A with different element of B
Injective

A function f : A → B is called _____ if the range of f is B.
Onto/Surjective

Consider two non – empty set A and B, we define the function π1a,b=a.π1 is called the _____ of A×B onto A
Projection

A function that is both one to one and onto is called _____
Bijective

Any set which is equivalent to the set 1,2,…,n, for some n ∈ N, is called a _____ set.

Finite

A set that is not _____ is called infinite set
Finite

A function f : A → B has an inverse if and only if is _____

Bijective

A natural number p(≠1) is called _____ if its only divisor are 1 and p
Prime

If a natural number n(≠1) is not a prime, then it is called a _____ number
Composite

Let A be any set, the function IA :A→A : IAa=a is called _____ on A.
Identity function

Let S be a non – empty set, any function S×S → S is called a _____ on S.
Binary operation

Let be a binary operation on a set S. we say that: is _____ on a subset T of S if ab ∈ T ∀ a,b ∈ T
Closed

Let be a binary operation on a set S. we say that: is _____ if, for all a,b,c ∈ S, (ab)c = a ×(bc).
Associative

Let be a binary operation on a set S. we say that: is _____ if for all a,b|s, ab = ba
Commutative

If ° and are two binary operations on a set S, we say that is _____.
Distributive over

.Let be a binary operation on a set S. if there is an element e ∈ S such that ∀ a∈ S, a e = a and e a = a then e is called an_____ for .
Identity element

The Cayley table is named after the famous mathemathecian
Arthur Cayley

_____ system consists of a set with a binary operation which satisfies certain properties is called a group
Algebraic

Let G be a group, for a ∈ G, we define
a0=e
a0=an-1, if n>0
a-a=(a-1)n, if n>0
n is called the exponent (or index) of _____ an of a
The integral power

≡ is an equivalence relation, and hence partition Z into disjoint equivalence classes called _____ modulo n.
Congruence class

If the set X is finite, say X = (1,2,3, …, n) then we denote S(x) by Sn and each of Sn is called a _____ on n symbols
Permutation