ACHIEVER'S EDUCATION CONSULTANT
08141710097
SUMMARY OF MTH102 WITH PAST QUESTIONS

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Introduction

MTH 102 - Elemetary Mathematics II is designed to teach you how differential and integral calculus could be used in solving problems in the contemporary business, technological and scientific world.

What you will learn in this Course

You will be taught the basis of mathematics required in solving s c i e n t i f i c problems.

Course Aim

You should read the objectives of each unit and bear them in mind as you go through the unit.
Course Objectives The objectives of this course are

∗ To inculcate appropriate mathematical skills required in Science and Engineering. ∗ Educate learners on how to use mathematical Techniques in solving real life problems.

Working through this Course

{ You have to work through all the study units in the course.

[...]

Pure Mathematics for Advanced Level By B.D Bunday H Mulholland1970. Introduction to Mathematical Economics By Edward T. Dowling.

Mathematics for Commerce & Economics By Qazi Zameeruddin &

{ In this file, you will find all the details of the work you must submit to your tutor for marking.

*** Introduction to Mathematical Economics SCHAUM"S Out lines Assignment File**

Presentation Schedule The Presentation Schedule included in your course materials gives you the important dates for the completion of tutor-marked assignments and attending tutorials. Remember, you are required to submit all your assignments by the due date. You should guard against falling behind in your work. Your assessment will be based on tutor-

marked assignments and a final examination which you will write at the end of the course.

Exercises TMAS

You are advised to work through all the assignments and submit them for assessment. Your tutor will assess the assignments and select four which will constitute the 30% of your final grade. The tutor-marked assignments may be presented to you in a separate file.

Final Examination and Grading

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{ At the end of the course, you will write a final examination which will constitute 70% of your final grade. In the examination which shall last for two hours, you will be requested to answer three questions out of at least five questions. Course marking Scheme This table shows how the actual course marking as it is broken down.

[...]

In distance learning, the study units replace the university lecture. Think of it as reading the lecture instead of listening to the lecturer. In the same way a lecturer might give you some reading to do, the study units tell you when to read, and which are your text materials or set books. You are provided exercises to do at appropriate points, just as a lecturer might give you an in-class exercise.

Next to this is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit. These learning objectives are meant to guide your study. The moment a unit is finished, you must go back and check whether you have achieved the objectives.

If this is made a habit, then you will significantly improve your chances of passing the course. The main body of the unit guides you through the required reading from other sources. This will usually be either from your set books or from a Reading section. The following is a practical strategy for working through the course.

If you run into any trouble, telephone your tutor. When you need assistance, do not hesitate to call and ask your tutor to provide it.

In addition do the following

Note the time you are expected to spend on each unit and how the assignments relate to the units. Important information, e.g. details of your tutorials, and the date of the first day of the Semester is available from the study centre. You need to gather all the information into one place, such as your diary or a wall calendar. Whatever method you choose to use, you should decide on and write in your own dates and schedule of work for each unit.

Once you have created your own study schedule, do everything to stay faithful to it. If you get into difficulties with your schedule, please, let your tutor know before it is too late for help. You will need your set books and the unit you are studying at any point in time. Keep in touch with your study centre.

Up-to-date course information will be continuously available there. Well before the relevant due dates , keep in mind that you will learn a lot by doing the assignment carefully. They have been designed to help you meet the objectives of the course and, therefore, will help you pass the examination. When you are confident that you have achieved a unit's objectives, you can start on the next unit.

Proceed unit by unit through the course and try to pace your study so that you keep yourself on

schedule. When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next unit. When the Assignment is returned, pay particular attention to your tutor's comments, both on the tutor-marked assignment form and also the written comments on the ordinary assignments.

Yes, each value of determines exactly one value of y is a

Note that the equations that assign two values to the dependent variable for a given value of the independent variable do not define functions of x.

Determine whether each equation defines as a function as a function of x

Isolate y2 by subtracting x2 from both sides.

Apply the square root properly: if u2=d then

When using an equation to define a function, you generally isolate the dependent variable on the left. For instance, writing the equation indicates that y is the dependent variable. The symbol f is read as ''f of x'' or ''f at x'' and it denotes the value of the independent variable or the value of the function at the number x. For instance, the value of f when x 3 is The value f is called a function value and lies in the range of f.

One of the advantages of function notation is that it allows you to be less wordy.

When x= 1, the value of is f = 2x2 4x 1

This is the given function.

F = 2x2 – 4x + 1

Because two different values of x yield the same value of f, the function is not one to one, as shown in fig 1.21.

You can use the horizontal line to test or determine whether the function in Example

1 intersects the graph of the function twice, the function is not one to one.

2 5 x2 4x 4 5x 10 5

We find f by substituting x 2 for x in the equation.

5x

Using the result of part , you can write the following.

2 4 x

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Graphs of Functions The graph of a function is the graph of its ordered pairs. For example, the graph of f = 3x is the set of points in the rectangular coordinates system satisfying y = 3x. When this convention is used, the test described in Example 1 has vertical line test. These two values excluded from the domain because division by zero is undefined.

Example 6:Finding the Domain and Range of a function

So, the range is the interval y 0or 0, The graph of the function, shown in figure 1.22 confirms these results.

[...]

Because this function is defined for x and for x I, the domain is the entire set of real numbers. This function is called piecewise – definedfunction because it is defined by two or more equations over a specified domain.

When x

This geometrical interpretation is the horizontal line test for one to one functions. So, a graph that represents a one- to –one test must satisfy both the vertical line test and the horizontal line test.

The vertical line test for function

If any vertical line intersects a graph in more than one point, the graph does not define y as a function of x. Y is a function of x y is not a function of x.

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Use the vertical line test to identify graphs in which y is a function of x

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Y is a function of x y is not a function of x.

When x = 4, the value of f is

In the following exercise, use the vertical line test to identify graphs in which y is a function of x. Combinations of functions The function given by = f g is the composite of f with g. Two functions can be combined in various ways to create new functions. For instance, if f = 2x – 3 and g = x2 + 1, you can form the following functions.

Forming composite functions

The composite of f with g is given by g f = 2g – 4 Evaluate f at g.

= 2x2 – 2

The composite of g with f is given by g f = f 2 + 1Evaluate g at f.

INVERSE FUNCTION

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The graphs of f and f-1 are mirror images of each other , as in figure 1.

Y=x F =

After you have found the inverse of a function, you should check your result. You can check your results graphically by observing that graphs of f and are reflections of each other in the line y =x. You can check your results algebraically by evaluating – both should be equal to x.

Find the inverse of function of

So, f does not pass the horizontal line test, which implies that if is not one- to- one and therefore has no inverse function. The same conclusion can be obtained by trying to find the inverse of f algebraically.

x2 + y2 = 4

Use interval notation to write your result.

Conclusion and Summary

A function is a correspondence from a first set, called the domain to a second set, called the range such that each element in the domain corresponds to exactly one element in the range.

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From the graph of f, shown in fig 2.

=0 the denominator

From the graph of f, shown in fig 2.

N:B

Specifically, when direct substitution can be used to evaluate the limit of a function at c, then the function is continuous at c.

[...]

If a function f is defined on I, and f is not continuous at c, then f is said to have a discontinuity at c. A discontinuity is called removable if f can be made continuous by appropriately defining f. A discontinuity at x = c is non removable if the function cannot be made continuous at x=c by defining or redefining the function at x=c. Let f be defined on a closed interval Then f is continuous on the closed interval . Moreover, f is continuous from the right at a andcontinuous from the left at b. Similar definitions can be made to cover continuity on intervals of the form

MTH102 List of Questions
Latex formatted questions may not properly render

Q1 Given f(x) = $$(7x^{4} - 5x^{3})$$, evaluate \[\frac{d f(x)}{d x}\]

- $$7x^{4}-5x^{3}$$
- $$2x^{3}-15x^{2}$$
- $$28x^{2}-15x^{2}$$
- $$28x^{3}-15x^{2}$$

Q2 Evaluate \[\int x^{2} e^{3x} dx\]

- \[\frac{e^{3x}}{3}\left(x^{2}-\frac{2x}{3}+\frac{2}{9}\right)+c\]
- \[-\frac{e^{3x}}{3}\left(x^{2}+\frac{2x}{3}-\frac{2}{9}\right)+c\]
- \[\frac{e^{2x}}{3}\left(x^{3}-\frac{x}{4}+\frac{2}{9}\right)+c\]
- \[\frac{e^{x}}{3}\left(x^{2}+\frac{2x}{3}-\frac{2}{5}\right)+c\]

Q3 Find the volume of a sphere generated by a semicircle \[y=\sqrt(r^{2}-x^{2})\] revolving around the x-axis

- \[-\pi\frac{-r^{3}}{2}\]
- \[4\pi\frac{r^{3}}{2}\]
- \[\pi\frac{r^{3}}{4}\]
- \[4\pi\frac{r^{3}}{3}\]

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Q4 Determine \[\int\frac{x^{2}+1}{(x+2)^{3}}\]

- \[ln (x+2)+\frac{4}{x+2}-\frac{5}{2(x+3)^{2}}+c\]
- \[ln (x+2)-\frac{4}{x+2}-\frac{5}{2(x+3)^{2}}+c\]
- \[-ln (x+2)-\frac{4}{x+2}-\frac{5}{2(x+3)^{2}}+c\]
- \[ln (x-2)+\frac{4}{x-2}-\frac{5}{2(x+3)^{2}}+c\]

Q5 Evaluate \[\int \frac{x+1}{x^{2}-3x+2} dx\]

- \[3ln(x+2)-2ln(x+1)+c\]
- \[3ln(x-2)-2ln(x-1)+c\]
- \[-3ln(x-2)-2ln(x-1)+c\]
- \[3ln(x-2)+2ln(x+1)+c\]

Q6 Find $$ \int {\sec^3 x}{\tan x}dx$$

- $$\sin 2x+c$$
- $$\cos 2x+c$$
- $$\frac{\sec^3 x}{3}+c$$
- $$\frac{\cos^3x}{2} +c$$

Q7 Find the $$\int {\tan^3 x}{\sec^3 x}dx$$

- $$\tan^2 x+1$$
- $$\cot^2 x+1$$
- $$\sec^2 x+1$$
- $$\sec^2 x$$

Q8 Find $$\int x\cos ax^2dx$$ with respect to x

- $$\cos^3 x+c$$
- $$\sin 2x+c$$
- $$\sec^2 x+1$$
- $$\frac{1}{2}a\sin ax^2+c$$

Q9 Evaluate \[\int x e^{6x} dx\]

- \[\frac{x}{6}e^{6x}-1\frac{1}{36}e^{6x}+c\]
- \[\frac{x}{3}e^{6x}+1\frac{1}{6}e^{6x}+c\]
- \[\frac{x}{6}e^{6x}+1\frac{1}{36}e^{6x}+c\]
- \[-\frac{x}{6}e^{6x}+1\frac{1}{36}e^{6x}+c\]

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Q10 Evaluate $$\int e^{4x}dx$$

- $$\frac{1}{4}e^{4x}+c$$
- $$ex+c$$
- $$3e^\frac{x}{3}+c$$
- $$\frac{1}{3}ex+c$$

Q11 Integrate with respect to x :$$ \int_{1}^{4}\frac{x+1}{\sqrt{x}}dx$$

- $$\frac{20}{3}$$
- 20
- $$\frac{3}{20}$$
- -20

Q12 Integrate with respect to x :$$ \int_{-1}^{3}\frac{x}{\sqrt{7+x^2}}dx$$

- $$2\sqrt{2}$$
- $$4\sqrt{2}$$
- $$4 - 2\sqrt{2}$$
- $$\sqrt{2}$$

Q13 Integrate with respect to x :$$ \int_{-1}^{2}\frac{x^2}{(x^3+4)^2}dx$$

- 12
- $$\frac{1}{2}$$
- 6
- $$\frac{5}{12}$$

Q14 Evaluate \[\int_{-1}^{2} y^{2}+y^{-2} dy\]

- \[\frac{7}{16}\]
- \[\frac{3}{16}\]
- \[\frac{17}{16}\]
- \[\frac{5}{16}\]

Q15 Find the integral with respect to x $$ \int \cos x\sin x dx$$

- $$\frac{\sin{^2} x}{2} +c$$
- $$\sin 2x+c$$
- $$\frac{\cos^{2} x}{2}+c$$
- \[\sin x\]

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Q16 Evalute \[\int x^{2}(3-10x^{3})dx\]

- \[\frac{1}{150}(3-10x^{3})^5)+c\]
- \[\frac{1}{10}(1-10x^{2})^5)+c\]
- \[\frac{1}{15}(3-20x^{3})^5)+c\]
- \[\frac{1}{100}(3-2x^{3})^5)+c\]

Q17 Evaluate \[\int 3e^{x}+5\cos (x) -10 \sec^{2}(x) dx\]

- \[3e^{2}+5\sin x-10\tan x+c\]
- \[3e^{x}+\cos x-10\tan x+c\]
- \[3e^{x}+5\sin x-10\sec x+c\]
- \[2e^{x}- x-10\tan x+c\]

Q18 Evaluate \[\int \cos (6x+4)dx\]

- \[\frac{\sin (6x+4)}{6}+c\]
- \[\frac{\cos(6x+4)}{6}+c\]
- \[\frac{\tan(6x+4)}{6}+c\]
- \[\frac{\sec (6x+4)}{6}+c\]

Q19 Evaluate \[\int(3x-2)^{6} dx\]

- \[\frac{(3x+2)^{7}}{2}+c\]
- \[\frac{(3x+2)^{7}}{21}+c\]
- \[\frac{(3x-2)^{7}}{21}+c\]
- \[\frac{3(3x-2)^{7}}{2}+c\]

Q20 Integrate \[\int (x^{3}+3x^{2}+2x+4)\]

- \[\frac{x^{4}}{4}+x^{3}+x^{2}+4x+c\]
- \[\frac{x^{4}}{2}-x^{3}+x^{2}+4x+c\]
- \[3\frac{x^{4}}{4}+2x^{3}+x+c\]
- $$6x^{4}-3x^{2}+c$$

Q21 Differentiate \[y=3\sqrt(x^2)(2x-x^{2})\] with respect to x

- \[y=\frac{10 x^{\frac{2}{3}}}{3}-\frac{8 x^{\frac{5}{3}}}{3}\]
- \[y=\frac{10 x^{\frac{2}{3}}}{3}+\frac{8 x^{\frac{5}{3}}}{3}\]
- \[y=\frac{5 x^{\frac{2}{3}}}{3}-\frac{4 x^{\frac{5}{3}}}{3}\]
- \[y=\frac{5 x^{\frac{2}{3}}}{3}+\frac{4 x^{\frac{5}{3}}}{3}\]

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Q22 Differentiate with respect to x: \[f(x) = (ax{^3} + bx)\]

- $$3a - b$$
- $$ax^{2} + b$$
- $$3x^{2} + 1$$
- $$3ax^{2} + b$$

Q23 Given \[y(x)=x^{4} - 4x^{3} + 3x^{2} -5x \], evaluate \[\frac{d^{4} y}{d x^{4}}\]

- 30
- 42
- 24
- 22

Q24 Given \[\frac{2x^{5}+x^{2}-5}{t^{2}}\], find \[\frac{d y}{d x}\] by using the first principle

- c\[-t^{-2}+8t^{-3}\]
- \[6t+7t^{-3}\]
- \[t^{2}+5t^{-3}\]
- \[6t^{2}+10t^{-3}\]

Q25 Find the derivative \[f(x)=2x^{2}-16x+35\] by using first principle

- \[x+16\]
- \[4x-16\]
- \[3x-5\]
- \[2x-8\]

Q26 Evaluate the limit \[\lim {x\rightarrow \infty} \frac{6e^{4x}-e^{-2x}}{8e^{4x}-e^{2x}+3e^{-x}}\]

- \[\frac{3}{4}\]
- \[\frac{1}{4}\]
- \[\frac{1}{2}\]
- \[\frac{3}{5}\]

Q27 Evaluate the limit \[\lim {x\rightarrow -\infty} \frac{x^{2}-5t-9}{2x^{4}+3x^{3}}\]

- 4
- 2

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- 0
- 1

Q28 Evaluate the limit \[\lim {x\rightarrow \infty} \frac{2x^{4}-x^{2}+8x}{-5x^{4}+7}\]

- \[\frac{1}{3}\]
- \[\frac{2}{3}\]
- \[\frac{1}{2}\]
- \[\frac{3}{4}\]

Q29 Evaluate the limit \[\lim {t\rightarrow 4} \frac{t-\sqrt(3+4)}{4-t}\]

- \[\frac{-3}{8}\]
- \[\frac{-5}{8}\]
- \[\frac{-1}{8}\]
- \[\frac{3}{4}\]

Q30 Evaluate the limit \[\lim_{h\rightarrow 0}\frac{2(-3+h)^{2}-18}{h}\]

- 12
- 8
- 14
- 6

Q31 Differentiate \[y=3\sqrt(x^2)(2x-x^{2})\] with respect to x

- \[y=\frac{10 x^{\frac{2}{3}}}{3}-\frac{8 x^{\frac{5}{3}}}{3}\]
- \[y=\frac{10 x^{\frac{2}{3}}}{3}+\frac{8 x^{\frac{5}{3}}}{3}\]
- \[y=\frac{5 x^{\frac{2}{3}}}{3}-\frac{4 x^{\frac{5}{3}}}{3}\]
- \[y=\frac{5 x^{\frac{2}{3}}}{3}+\frac{4 x^{\frac{5}{3}}}{3}\]

Q32 Differentiate with respect to x: \[f(x) = (ax{^3} + bx)\]

- $$3a - b$$
- $$ax^{2} + b$$
- $$3x^{2} + 1$$
- $$3ax^{2} + b$$

Q33 Given \[y(x)=x^{4} - 4x^{3} + 3x^{2} -5x \], evaluate \[\frac{d^{4} y}{d x^{4}}\]

- 30
- 42

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- 24
- 22

Q34 Given \[\frac{2x^{5}+x^{2}-5}{t^{2}}\], find \[\frac{d y}{d x}\] by using the first principle

- c\[-t^{-2}+8t^{-3}\]
- \[6t+7t^{-3}\]
- \[t^{2}+5t^{-3}\]
- \[6t^{2}+10t^{-3}\]

Q35 Find the derivative \[f(x)=2x^{2}-16x+35\] by using first principle

- \[x+16\]
- \[4x-16\]
- \[3x-5\]
- \[2x-8\]

Q36 Evaluate the limit \[\lim {x\rightarrow \infty} \frac{6e^{4x}-e^{-2x}}{8e^{4x}-e^{2x}+3e^{-x}}\]

- \[\frac{3}{4}\]
- \[\frac{1}{4}\]
- \[\frac{1}{2}\]
- \[\frac{3}{5}\]

Q37 Evaluate the limit \[\lim {x\rightarrow -\infty} \frac{x^{2}-5t-9}{2x^{4}+3x^{3}}\]

- 4
- 2
- 0
- 1

Q38 Evaluate the limit \[\lim {x\rightarrow \infty} \frac{2x^{4}-x^{2}+8x}{-5x^{4}+7}\]

- \[\frac{1}{3}\]
- \[\frac{2}{3}\]
- \[\frac{1}{2}\]
- \[\frac{3}{4}\]

Q39 Evaluate the limit \[\lim {t\rightarrow 4} \frac{t-\sqrt(3+4)}{4-t}\]

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- \[\frac{-3}{8}\]
- \[\frac{-5}{8}\]
- \[\frac{-1}{8}\]
- \[\frac{3}{4}\]

Q40 Evaluate the limit \[\lim_{h\rightarrow 0}\frac{2(-3+h)^{2}-18}{h}\]

- 12
- 8
- 14
- 6

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