Course id: BIT 116 **Course Name: Maths I**
Program: BIT FALL 2019
Semester: 1 Year/ I semester

COLLEGE OF MANAGEMENT & INFORMATION TECHNOLOGY

BACHELOR IN INFORMATION TECHNOLOGY

ASSIGNMENT

Submitted by:

Name: Sunil Kumar Goley Tamang
Year/ Semester: First, Fall 2019
LCID: LC00017000862

Submitted to:

Name: Lincoln University

Date: 2020.06.03

1. Find the Domain and Range of $f(x) = \sqrt{2 - x - x^2}$
   - Solution:
     Here,
     $2-x-x^2=0$
     Or, (2+x) (1-x) = 0
     Either, x =1 or, -2
     The interval be (-∞,-2)U(-2,1)U(1,∞)
     Now, the sign conversion,

	2+x	1-x	(2+x)(1-x)
(-∞,-2)	-	+	-
(-2,1)	+	+	+
(1,∞)	+	-	-

Here, only the positive sign is taken. So, the Domain is found to be (-2,1).
For range,

$$y = \sqrt{2 - x - x^2}$$

$$= \sqrt{(2 + x)(1 - x)}$$

For, minimum value we take x=0, then the output will be maximum value. So the Range is (0,√2).

1. Find the solution of: $\frac{dx}{x^2+1} + \frac{dy}{y+1} = 0$
   - Solution:
     Here,
     Integrating both side;
     $$\int \frac{dx}{x^2 + 1} + \int \frac{dy}{y + 1} = 0$$
     Or, $\tan^{-1}x + \log(y+1) = 0$

2. Differentiate: $y = 4sect + tant$
   - Solution:
     Given,
     y= 4sect +tant
     Differentiate with respect to t we get,

     Or, $\frac{dy}{dt} = \frac{d(4sect+tant)}{dt}$

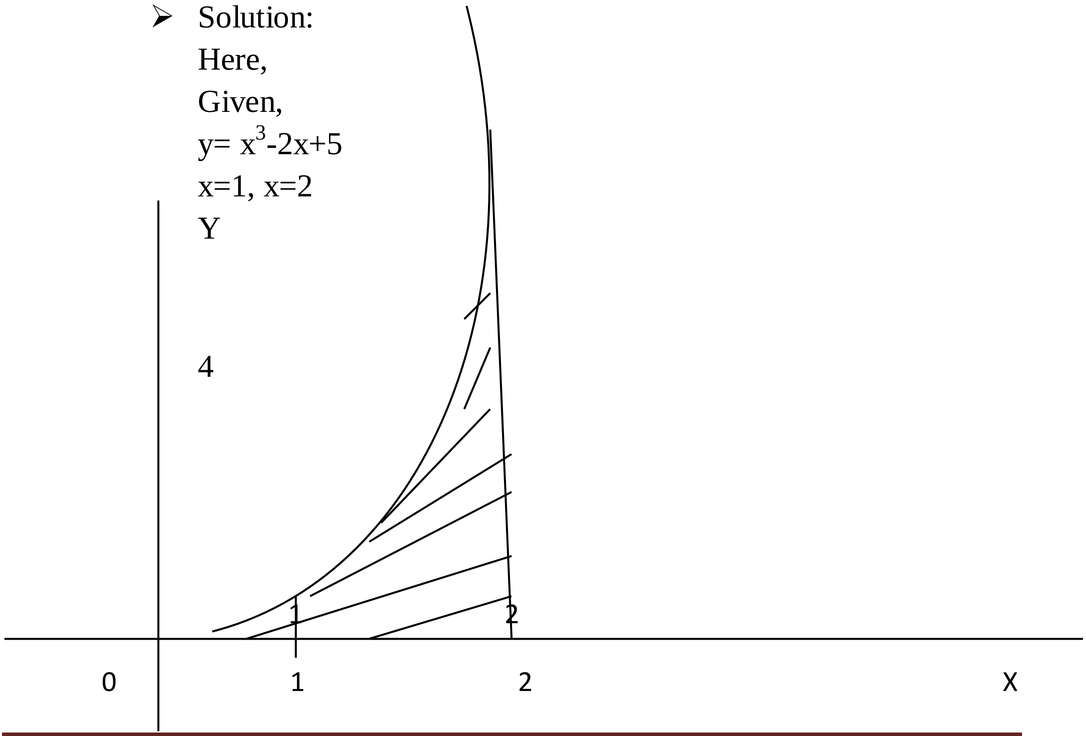
$\therefore \frac{dy}{dt} = 4sect.tant + sec^2t$

3. If f'(x)=$20x^3$-$12x^2$+6x, then find f(x).
   - Solution:
     Given,
     f''(x) = $20x^3$-$12x^2$+6x

     Integrating both sides we get,

     Or, $\int f''(x) = \int 20x^3 - 12x^2 + 6x$
     Or, f'(x) =$\int 20x^3$-$12x^2$+6x
     Or, f'(x) = $\frac{20x^4}{4} - \frac{12x^3}{3} + \frac{6x^2}{2}$
     Or, f'(x) = $5x^4$-$4x^3$+$3x^2$
     Integrating both sides we get,
     Or, $\int f'(x) = \int 5x^4 - 4x^3 + 3x^2$
     Or, f(x) = $\frac{5x^5}{5} - \frac{4x^4}{4} + \frac{3x^3}{3}$
     Or, f(x) = x^5-x^4+x^3
     Hence, f(x) is found to be x^5-x^4+x^3.

4. Find the area enclosed between x axis, the curve y= x^3-2x+5 and the ordinates x=1 and x=2.
   - Solution:
     Here,
     Given,
     y= x^3-2x+5
     x=1, x=2



From the formula;

Area= $\int_a^b (upper\ function - lowerfunction)dx$

Now a=1 and b=2 then the function becomes

A= $\int_1^2 x^3 - 2x + 5$

A= $[\frac{x^4}{4} - \frac{2x^2}{2} + 5x]_1{}^2$

A= [4-4+10]-[$\frac{1}{4} + 4$]

A= 10- $\frac{17}{4}$

∴ A= 5.75 sq.unit

Hence, the area enclosed between x-axis is found to be 5.75 sq unit.

5. Find $\int \frac{dx}{e^x + 1}$ (Antiderivatives)
   - Solution:
     Given,
     Or, $\int \frac{dx}{e^x+1}$
     Or, $\int \frac{e^x+1-e^x}{e^x+1} dx$
     Or, $\int \frac{e^x+1}{e^x+1}$dx -$\int \frac{e^x}{e^x+1} dx$
     Or, $\int dx - \ln(e^x+1)$
     Or, x- $\ln(e^x+1)$ +C
     ∴ Antiderivatives of the function $\int \frac{dx}{e^x+1}$ is found to be x-$\ln(e^x+1)$+C.

6. State and Verify mean value theorem for f(x)= x^3-x in [0,2]
   - Solution:
     Here,
     Given function is f(x) = x^3-x which is continuous on close interval [a,b]
     Then, there exist some number in c in [a,b] such that f'(c)
     f'(c) = $\frac{f(b)-f(a)}{b-a}$
     [a,b]=[0,2]
     Then, a=0 and b= 2.

Now, $f(a)=x^3-x$
Or, $f(0)=0$
$f(b)= x^3-x$
$f(2)= 6$
Or, $f'(c) = \frac{f(b)-f(a)}{b-a}$
Or, $f'(c) =\frac{6-0}{2-0}$
$\therefore$ $f'(c) =3$
Again, $f'(c)= 3x^2$
From above we found $f'(c)= 3$
Or, $3= 3x^2$
Or, $x= 1$
Therefore, 1 lies between the interval 0 and 2. Hence, it proves mean value theorem.