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**MATRIC NO: 19/ENG02/040**

**COURSE CODE: MAT 104**

**COURSE TITLE: GENERAL MATHEMATICS III**

**QUESTIONS:**

1. Determine the stationary point, coordinate of the stationary point and nature of the stationary point of the curve y = t3- t2/2 - 2t + 4

2. If 2y2- 5x4- 2 - 7y3= 0, find dy/dx

3. Find dy/dx if 4x2+2xy3-5y2=0 and evaluate dy/dx when x=1 and y = 2.

**ANSWER:**

1. Stationary point

y = t3- t2/2 - 2t + 4

 dy/dt = 3t2-t-2

coordinate of the stationary point

0=3t2-t-2

3t2-t-2 = 0

3t2-3t+2t-2 =0

(3t2-3t) + (2t- 2) = 0

3t (t-1) + 2(t – 1) = 0

(3t + 2) (t- 1) = 0

3t+2 = 0 or t-1 = 0

3t= -2 or t = 1

t= -2/3 or t=1

for t= -2/3

3(-2/3)2 – (-2/3)-2

3(4/9) +2/3 -2

4/3+2/3-2

6/3 – 2

(6-6)/3

0/3

= 0

(0, -2/3) is a coordinate

For t=1

3(1)2-(1)-2

3-1-2

3-3

= 0

So (0,1) is a coordinate

Nature

Recall that dy/dt = 3t2-t-2

 Then, d2y/dt2= 6t

for t=-2/3

6(-2/3) = -4

Maximum nature is therefore (-4, 0)

For t=1

6(1) = 6

Minimum nature is (0 ,6)

1. 2y2-5x4-2-7y3=0

dy/dx = 4y-20x3-(2\*0)-21y2

 dy/dx= 4y-20x3-21y2

1. 4x2+2xy3-5y2= 0

d/dx(4x2-5y2) + d/dx(2xy3)

8x-10ydy/dx + 2y3+2x(3y2)dy/dx

8x-10y+2y3+6xy2 dy/dx

dy/dx (10y-2y3-6xy2) = 8x

dy/dx =$ \frac{8x}{10y-2y^{3}-6xy^{2}}$

inserting x=1 and y=2

Therefore, $\frac{8×1}{\left(10×2\right)-2\left(2\right)^{3}-6×1×2^{2}}$

 = $\frac{8}{-16-24+20}$

= $\frac{8}{-40+20}$

= $-\frac{8}{20}$

 = $-\frac{2 }{5}$