

NAME: EKUEZOR CHINAZA UOENINA.
 DEPARTMENT: ELECTRICAL/ELECTRONICS ENGINEERING.
 MATRIC NO: 19/ENG04/015 SERIAL No.: 19
 MATHS ASSIGNMENT 3

1.) $y = \frac{t^3 - t^2 - 2t + 4}{2}$

At stationary point, $\frac{dy}{dt} = 0$

$\frac{dy}{dt} = \frac{3t^2 - 2t - 2}{2} + 4$; $3t^2 - t - 2 = 0$

$(t-1)(t+\frac{2}{3}) = 0$

$\therefore t = 1$ and $-\frac{2}{3}$.

\therefore Stationary points are at $t = 1$ and $t = -\frac{2}{3}$

The coordinate at $t = 1$; $\frac{(1^3) - (1^2) - 2(1) + 4}{2} = \frac{5}{2}$

\therefore Coordinate is $(1, \frac{5}{2})$

The coordinate at $t = -\frac{2}{3}$; $\frac{(-\frac{2}{3})^3 - (-\frac{2}{3})^2 - 2(-\frac{2}{3}) + 4}{2} = \frac{130}{27}$

The coordinate at $t = -\frac{2}{3}$; $(-\frac{2}{3}, \frac{130}{27})$

\therefore Coordinates are $(1, \frac{5}{2})$ and $(-\frac{2}{3}, \frac{130}{27})$

$\frac{dy}{dt} = 3t^2 - t - 2$

$\frac{d^2y}{dt^2} = 6t - 1$ At $t = 1$; $6(1) - 1 = 5$

At $t = -\frac{2}{3}$; $6(-\frac{2}{3}) - 1 = -5$

\therefore The stationary point at $t = 1$ is a minimum point and the stationary point at $t = -\frac{2}{3}$ is a maximum point.

2.) $2y^2 - 5x^4 - 2 - 7y^3 = 0$, find $\frac{dy}{dx}$

$\frac{d(2y^2)}{dx} - \frac{d(5x^4)}{dx} - \frac{d(2)}{dx} - \frac{d(7y^3)}{dx} = 0$

$4y \frac{dy}{dx} - 20x^3 - 0 - 21y^2 \frac{dy}{dx} = 0$

$4y \frac{dy}{dx} - 21y^2 \frac{dy}{dx} = 20x^3$

$\frac{dy}{dx} (4y - 21y^2) = 20x^3$

$$\therefore \frac{dy}{dx} = \frac{dy}{dx} = \frac{20x^3}{4y - 2y^2}$$

(3) $4x^2 + 2xy^3 - 5y^2 = 0$, find $\frac{dy}{dx}$

$$\frac{d}{dx}(4x^2) + \frac{d}{dx}(2xy^3) - \frac{d}{dx}(5y^2) = 0$$

$$8x + 2 \left[y^3 + 3y^2 \frac{dy}{dx} \right] - 10y \frac{dy}{dx} = 0$$

$$8x + 2y^3 + 6y^2 x \frac{dy}{dx} - 10y \frac{dy}{dx} = 0$$

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

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

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

when $x=1$ and $y=2$; $\frac{dy}{dx} = \frac{-8(1) - 2(2^3)}{6(2^2)(1) - 10(2)} = \frac{-8 - 16}{24 - 20} = \frac{-24}{4} = \underline{\underline{-6}}$