

NAME: ALONYENU TREASURE AGBENU-OWO

DEPARTMENT: CIVIL ENGINEERING

MATRIC NUMBER: 19/ENG03/005

MAT 104 ASSIGNMENT

✓ Alorazema Treasure Agbenu-oro

✓ Civil Engineering

✓ 19/ENG03/005

✓ MAT 104 Assignment

① $y = t^3 - t^2 - 2t - 4$; $\frac{dy}{dt} = 3t^2 - t - 2$

at stationary point, $\frac{dy}{dx} = 0$; $\therefore 3t^2 - t - 2 = 0$

Using quadratic formula $t = 1 - \frac{2}{3}$

at $t = 1$, $y = 3(1)^2 - 1 - 2 = 0$.

at $t = -\frac{2}{3}$, $y = 3(-\frac{2}{3})^2 + 1(-\frac{2}{3}) - 2 = 3(\frac{4}{9}) - \frac{2}{3} - 2 = \frac{4}{3} - \frac{2}{3} - 2 = -\frac{4}{3}$

\therefore the stationary point co-ordinates are $(1, 0)$ and $(-\frac{2}{3}, -\frac{4}{3})$

$$\frac{d^2y}{dt^2} = 6t - 1$$

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

at $t = -\frac{2}{3}$; $\frac{d^2y}{dt^2} = 6(-\frac{2}{3}) - 1 = -5$

$\frac{d^2y}{dt^2} \geq 0$; \therefore we have a minimum point

$\frac{d^2y}{dt^2} \leq 0$; \therefore we have ~~max~~ maximum point

② $2y^2 - 5x^4 - 2 - 7y^3 = 0$

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

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

$$\frac{dy}{dx} = \frac{20x^3}{40y - 21y^2}$$

$$\textcircled{3} \quad 4x^2 + 2xy^3 - 5y^2 = 0$$

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

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

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

$$\text{at } x = 1, y = 2; \frac{dy}{dx} = \frac{4(1) + (2)^3}{-3(1)(2)^2 + 5(2)}$$

$$= \frac{4 + 8}{-3(4) + 10}$$

$$= \frac{12}{-2}$$

$$= -6$$

