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ELECT ELECT ENGINEERING

19/ENG04/055

MAT 104 ASSIGNMENT

$$(i) y = t^3 - t^2/2 - 2t + 4$$

at Stationary point  $dy/dt = 0$

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

$$3t^2 - t - 2 = 0$$

$$3t^2 - 3t + 2t - 2 = 0$$

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

$$(3t+2) = 0 \quad (t-1) = 0$$

$$t = -2/3 \text{ OR } +1$$

(ii) Coordinates of Stationary Point

at  $t = -2/3$

$$y = (-2/3)^3 - (-2/3)^2/2 - 2(-2/3) + 4$$

$$y = 130/27$$

at  $t = 1$

$$y = 1^3 - 1^2/2 - 2(1) + 4$$

$$y = 5/2$$

$(-2/3, 130/27)$  and  $(1, 5/2)$  are the coordinates of the stationary point.

(iii) Nature of Stationary point

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



$$\text{at } t = -2/3$$

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

Since the result is negative we have a maximum point

$$\text{at } t = 1$$

$$\frac{d^2y}{dt^2} = 6 - 1 = 5$$

Since the result is positive we have a minimum point

$$(2) \quad 2y^2 - 5x^4 - 2 - 7y^3 = 0$$

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

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

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

$$(3) \quad 4x^2 + 2xy^3 - 5y^2 = 0$$

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

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

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

When  $x = 1$  and  $y = 2$

$$\frac{dy}{dx} = \frac{-8 - 16}{24 - 20} = \frac{-24}{4} = -6$$