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Computer Engineering
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MAT 104
Assignment

1 $y = t^3 - t^2/2 - 2t + 4$

$\frac{dy}{dt}$ at stationary point $= 0$

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

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

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

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

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

$3t + 2 = 0 \qquad t - 1 = 0$

$t = -2/3 \qquad t = 1$

For the Coordinate of the stationary point when $t = -2/3$

$= -0.67$

$y = t^3 - t^2/2 - 2t + 4$

$y = (-0.67)^3 - \frac{(-0.67)^2}{2} - 2(-0.67) + 4$

$y = -0.301 - 0.224 + 1.34 + 4$

$y = 5.34 - 0.525$

$y = 4.815$

when $t = 1$

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

$1 - 1/2 - 2 + 4$

$y = 5 - 2.5$

$y = 2.5$

the coordinates: $(0.67, 4.815)$ $(1, 2.5)$

Nature of stationary point

when $t = -2/3$ or 0.67

$y = (-0.67)^3$

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

when $t = -0.67$ and 1

at $t = -0.67$

$\frac{d^2y}{dx^2} = 6(-0.67) - 1$

$= -5.02$

$t = 1$

$\frac{d^2y}{dx^2} = 6(1) - 1$

$= 5$

∴ when $x = -0.67$ it is at a maximum point and when $x = 1$ it is at a minimum point

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

$(4y\, dy/dx) - 20x^3 - (21y^2\, dy/dx) = 0$

$4y\, dy/dx - 21y^2\, dy/dx = 20x^3$

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

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

3 Find $\frac{dy}{dx}$ if $4x^2 + 2xy^3 - 5y^2 = 0$ and evaluate $\frac{dy}{dx}$ when $x =$ and $y = 2$

$$4x^2 + 2xy^3 - 5y^2 = 0$$

$$8x + 6xy^2 - 10y =$$

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

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

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

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