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

Sol:

$$8x + 2y^3 + 2x \cdot 3y^2 \, dy/dx - 10y \, dy/dx = 0$$

$$8x + 2y^3 + 6xy^2 \, dy/dx - 10y \, dy/dx = 0$$

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

$$(10y - 6xy^2) \, dy/dx = 8x + 2y^3$$

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

when $x = 1; y = 2$

$$dy/dx = \frac{8(1) + 2(2)^3}{10(2) - 6(1)(2)^2}$$

$$= -6$$

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

$$dy/dt = 3t^2 - t - 2$$

At stationary point $dy/dt = 0$

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

Solving the quadratic equation

$t = 1$; or $t = -2/3$

when, $t = 1$

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

$= 5/2$

when, $t = -2/3$

$y = (-2/3)^3 - \frac{\left(\frac{-2}{3}\right)^2}{2} - 2\left(-\frac{2}{3}\right) + 4$

$= 130/27$

$\therefore$ the coordinates of the stationery points are $(1, 5/2)$ and $(-2/3, 130/27)$

& for nature of the points

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

For $t = 1$

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

$= 5$

For $t = -2/3$

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

$= -5$

$\therefore$ the stationery point $(1, 5/2)$ is minimum and the stationery point $(-2/3, 130/27)$ is maximum.

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

find dy/dx

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

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

$8x + 2xy^3 - 10y = 0$