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

At stationary point, $dy/dt = 0$

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

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

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

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

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

$\therefore$ Coordinate is $(1, 5/2)$

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

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

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

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

$d^2y/dt^2 = 6t - 1$   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.

$2y^2 - 5x^4 - 2 - 7y^3 = 0$ , find $dy/dx$

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

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

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

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

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

5 $4x^2 + 2xy^3 - 5y^2 = 0$. Find $dy/dx$

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

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

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

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

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

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

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

$= \frac{-24}{4} = \underline{\underline{-6}}$