MATRIC NO: 17/MHS01/314

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LEVEL: 200

DEPARTMENT: Mechanical Engineering

COURSE: MAT 104

2. Given, $x = 4t^3 - t^2$ $y = t^4 + 2t^2$ at $t = 1$ & $t = 3$

Find the area under the curve

Using $A = \int_b^a (y(dx/dt)) \cdot dt$

$dx/dt = 12t^2 - 2t$

$$\Rightarrow A = \int_1^3 \left[(12t^2 - 2t)^4 + 2(12t^2 - 2t)^2 \right] \cdot dt$$

$$= \int_1^3 (12t^6 + 24t^4 - 2t^5 - 4t^3) \cdot dt$$

$$= \left[\frac{12t^7}{7} + \frac{24t^5}{5} - \frac{t^6}{3} - t^4 \right]_1^3$$

$$= (3747.43 + 1161.6 - 485.33 - 80)$$

$$\therefore A = 4343.7$$

3. Given, $x = 4t^3 - t^2$ $y = t^4 + 2t^2$

Find dy/dx.

Using $dy/dx = dy/dt \div dx/dt$

$dx/dt = 12t^2 - 2t$ $dy/dt = 4t^3 + 4t$

$$\Rightarrow dy/dx = \frac{4t^3 + 4t}{12t^2 - 2t}$$

$$= \frac{2t^2}{6t - 1} + \frac{2}{6t - 1}$$

$$\therefore dy/dx = \frac{2t^2 + 2}{6t - 1}$$