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Section # B

Quiz # 01

Subject # Calculus

Q1) Find

$$\int_0^1 \frac{4t^3-2t^2+3t-1}{2t^2+1}\,dt$$

Sol:-

$$\int_0^1 \frac{4t^3-2t^2+3t-1}{2t^2+1}\,dt$$

By Partial fraction method.

Divide $4t^3-2t^2+3t-1$ by $2t^2+1$

$$\int_0^1 2t-1+\frac{t}{2t^2+1}\,dt$$

$$\int_0^1 2t\,dt+\int_0^1 -1\,dt+\int_0^1 \frac{t}{2t^2+1}\,dt$$

$$2\int_0^1 dt+\int_0^1 -1\,dt+\int_0^1 \frac{t}{2t^2+1}\,dt$$

- using Power rule

$$2\left(\tfrac{1}{2}t^2\Big]_0^1\right)+\int_0^1 -1\,dt+\int_0^1 \frac{t}{2t^2+1}\,dt$$

Combine $\frac{1}{2}$ & t^2

$$2\left(\frac{t^2}{2}\Big]_0^1\right) + \int_0^1 -1\,dt + \int_0^1 \frac{t}{2t^2+1}\,dt$$

$$2\left(\frac{t^2}{2}\Big]_0^1\right) + (-t)\Big]_0^1 + \int_0^1 \frac{t}{2t^2+1}\,dt$$

Using Substitution

Let $U = 2t^2+1$ then $du = 4t\,dt$ So

$$\frac{1}{4}\,du = t\,dt$$

$$= 2\left(\frac{t^2}{2}\Big]_0^1\right] + (-t)\Big]_0^1 + \int_0^3 \frac{1}{U}\,\frac{1}{4}\,du$$

$$= 2\left(\frac{t}{2}\Big]_0^1\right] + (-t)\Big]_0^1 + \int_1^3 \frac{1}{4u}\,du$$

Applying limit we get

$$\boxed{f(x) = 0.2746}$$ Ans

Q2) Find

$$\int_2^3 t \sin t^2 \, dt$$

Soln:-

Let $u = t^2$

$du = 2t \, dt$

$dt = \frac{du}{2t}$

Replace the value of t & dt

$$= \int_2^3 t \sin u \frac{du}{2t}$$

$$= \int_2^3 \frac{1}{2} \sin u \, du$$

$$= -\frac{1}{2} \cos u \Big|_2^3$$

Replace u with t^2

$$= -\frac{1}{2} \cos t^2 \Big|_2^3$$ Applying limits

$$= -\frac{1}{2} \left(\cos (3)^2 - \cos (2)^2 \right)$$

$$= -\frac{1}{2}(\cos 9 - \cos 4)$$

$$= 0.0049 \text{ Ans}$$