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Subject = Applied Calculus

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Quiz # 01

Quiz: 1

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

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

combine $\frac{1}{2}$ & t^2.

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

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

Using Substitution.

= let $V = 2t^2+1$ then $du = 4t\,dt$ so,

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

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

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

= Applying limit we get

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

Q2. Find $\int_2^3 t \sin t^2\, dt$.

Sol = let $u = t^2$

$du = 2t\, dt$

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

Replace the value of t & dt.

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

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

$= -\frac{1}{2} \cos u \int_2^3$

Replace u with t^2.

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

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

$= -\frac{1}{2} (\cos 9 - \cos 4) = \boxed{F\ 0.0049}$ Ans.