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QUIZ : 01

SEMESTER: 2th

TEACHER: MAM SHOMALIA

QUESTION: 01

FIND

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

SOLUTION:

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

SOLVING BY PARTIAL FRACTION METHOD

NOW,

DIVIDE $4t^3 - 2t^2 + 3t - 1$ BY $2t^2 + 1$

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

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

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

NOW,

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 $\frac{1}{2}$ AND t^2

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

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

NOW;

USING SUBSTITUTION

LET;

$u = 2t^2+1$ THEN $du = 4t\,dt$

AND

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

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

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

NOW;

APPLY LIMIT

$$f(x) = 0.2746$$

QUESTION: 02

FIND

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

SOLUTION:

LET $u = t^2$

$du = 2t\,dt$

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

REPLACE THE VALUE OF "t" AND "dt"

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

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

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

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

NOW;

REPLACE "u" with "t^2"

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

NOW;

Apply Limits

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

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

$$= \boxed{0.0049}$$