Name Muhammad Montzam Khan
ID 16096
Section A

Q1 $\int_0^1 \frac{4t^3 - 2t^2 + 3t - 1}{2t^2+1}\, dt$

Sol^n $\int \left(\frac{x}{2t^2+1} + 2t - 1 \right) dt$

$\int \frac{x}{2t^2+1}\, dt + 2\int t\, dt - \int 1\, dx$

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

let

$u = 2t^2 + 1 \Rightarrow \frac{du}{dt} = 4t$

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

$= \frac{1}{4} \int \frac{1}{u}\, du$

$= \int \frac{1}{4u}\, du$

$= \ln(u)$

$= \frac{1}{4} \ln \frac{2x^2+1}{4}$

$= \int x\, dx$

$\int x^2\, dx = \frac{x^{n+1}}{n+1}$ $n \neq -1$

$= \frac{x^2}{2}$

$\int (dx)$

$= x$

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

Sol

Let $u = t^2$

$du = 2t \, dt$

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

Replace the value of t^2, 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 limit

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

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

$= 0.0049$ Ans

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

Sol^n

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

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

Applying limit

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

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

$= 0.0049$ Ans