

Evaluate $\int_0^1 x (2x^2 + 1)^2 dx$

- $I = [0, 1]$ is a closed interval.
- $f(x) = x (2x^2 + 1)^2$ is continuous on I .
- $F(x) = \int x (2x^2 + 1)^2 dx = \frac{1}{4} \int 4x (2x^2 + 1)^2 dx$

$$= \frac{(2x^2 + 1)^3}{12} + C$$

Remember that, $\int f' f^n dx = \frac{f^{n+1}}{n+1} + C$

Then, by using Fundamental theorem of Calculus

$$\begin{aligned} \int_0^1 x (2x^2 + 1)^2 dx &= \left[\frac{(2x^2 + 1)^3}{12} \right]_0^1 \\ &= \frac{1}{12} \cdot \left[(2x^2 + 1)^3 \right]_0^1 = \frac{13}{6} \end{aligned}$$