

Evaluate $\int_{-3}^1 6x^2 - 3x - 2 \, dx$

- $I = [-3, 1]$ is a closed interval.
- $f(x) = 6x^2 - 3x - 2$ is continuous on I since it is a quadratic function
- $F(x) = \int 6x^2 - 3x - 2 \, dx = \int 6x^2 \, dx - \int 3x \, dx - \int 2 \, dx$

$$= 2x^3 - \frac{3x^2}{2} - 2x + C$$

Then, by using Fundamental theorem of Calculus

$$\int_{-3}^1 6x^2 - 3x - 2 \, dx = \left[2x^3 - \frac{3x^2}{2} - 2x \right]_{-3}^1$$

$$= 2 \cdot x^3 \Big|_{-3}^1 - 3 \cdot \frac{x^2}{2} \Big|_{-3}^1 - 2 \cdot x \Big|_{-3}^1$$

$$= 2 \cdot (1 + 27) - 3 \cdot \left(\frac{1}{2} - \frac{9}{2} \right) - 2 \cdot (1 + 3)$$

$$= 60$$