

Topic: Part 2 of the FTC

Question: Use Part 2 of the Fundamental Theorem of Calculus to evaluate the integral.

$$\int_1^4 x^2 - 3x + 2 \, dx$$

Answer choices:

A $\frac{9}{2}$

B 6

C $\frac{11}{2}$

D 4



Solution: A

The Fundamental Theorem of Calculus says that

$$\int_a^b f(x) \, dx = F(b) - F(a)$$

where F is the antiderivative function of f . Since

$$F(x) = \int x^2 - 3x + 2 \, dx$$

$$F(x) = \int x^2 \, dx - \int 3x \, dx + \int 2 \, dx$$

$$F(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x$$

we have

$$\int_1^4 x^2 - 3x + 2 \, dx = \left[\frac{1}{3}(4)^3 - \frac{3}{2}(4)^2 + 2(4) \right] - \left[\frac{1}{3}(1)^3 - \frac{3}{2}(1)^2 + 2(1) \right]$$

$$\frac{64}{3} - \frac{48}{2} + 8 - \frac{1}{3} + \frac{3}{2} - 2$$

$$\frac{128}{6} - \frac{144}{6} + \frac{48}{6} - \frac{2}{6} + \frac{9}{6} - \frac{12}{6}$$

$$\frac{27}{6}$$

$$\frac{9}{2}$$



Topic: Part 2 of the FTC

Question: Use Part 2 of the Fundamental Theorem of Calculus to evaluate the integral.

$$\int_2^4 6x^2 \, dx$$

Answer choices:

- A 16
- B 112
- C 128
- D 24



Solution: B

The Fundamental Theorem of Calculus says that

$$\int_a^b f(x) \, dx = F(b) - F(a)$$

where F is the antiderivative function of f . Since

$$F(x) = \int 6x^2 \, dx$$

$$F(x) = 6 \int x^2 \, dx$$

$$F(x) = \frac{6}{3}x^3$$

$$F(x) = 2x^3$$

we have

$$\int_2^4 6x^2 \, dx = 2(4)^3 - 2(2)^3$$

112



Topic: Part 2 of the FTC

Question: Use Part 2 of the Fundamental Theorem of Calculus to evaluate the integral.

$$\int_{-1}^3 4x^2 - 5x \, dx$$

Answer choices:

A 32

B $-\frac{23}{6}$

C $\frac{27}{2}$

D $\frac{52}{3}$



Solution: D

The Fundamental Theorem of Calculus says that

$$\int_a^b f(x) \, dx = F(b) - F(a)$$

where F is the antiderivative function of f . Since

$$F(x) = \int 4x^2 - 5x \, dx$$

$$F(x) = 4 \int x^2 \, dx - 5 \int x \, dx$$

$$F(x) = \frac{4}{3}x^3 - \frac{5}{2}x^2$$

we have

$$\int_{-1}^3 4x^2 - 5x \, dx = \left[\frac{4}{3}(3)^3 - \frac{5}{2}(3)^2 \right] - \left[\frac{4}{3}(-1)^3 - \frac{5}{2}(-1)^2 \right]$$

$$\frac{108}{3} - \frac{45}{2} + \frac{4}{3} + \frac{5}{2}$$

$$\frac{112}{3} - \frac{40}{2}$$

$$\frac{112}{3} - \frac{60}{3}$$

$$\frac{52}{3}$$

