Topic: Definite integrals

Question: Evaluate the definite integral.

$$\int_2^4 \sqrt{\frac{3}{x}}\, dx$$

Answer choices:

A 2.03

B 0.20

C 0.79

D 3.51

Solution: A

First, we rewrite the integrand, and then we integrate.

$$\int_2^4 \sqrt{\frac{3}{x}}\, dx$$

$$\int_2^4 \sqrt{3}x^{-\frac{1}{2}}\, dx$$

$$\frac{\sqrt{3}x^{\frac{1}{2}}}{\frac{1}{2}}\Bigg|_2^4$$

$$2\sqrt{3}\sqrt{4} - 2\sqrt{3}\sqrt{2} \approx 2.03$$

Topic: Definite integrals

Question: Evaluate the definite integral.

Given $\int_0^5 f(x)\,dx = 2$ and $\int_5^8 f(x)\,dx = -4$, find $\int_0^8 f(x)\,dx$

Answer choices:

A 6

B -6

C 2

D -2

Solution: D

$$\int_0^8 f(x)\,dx = \int_0^5 f(x)\,dx + \int_5^8 f(x)\,dx$$

$$\int_0^8 f(x)\,dx = 2 + (-4)$$

$$\int_0^8 f(x)\,dx = -2$$

Topic: Definite integrals

Question: Evaluate the definite integral.

$$\int_1^3 x^2 - 7x + 5 \; dx$$

Answer choices:

A $-\frac{26}{3}$

B $-\frac{28}{3}$

C $-\frac{4}{7}$

D $-\frac{2}{7}$

Solution: B

Integrate one term at a time.

$$\frac{1}{2+1}x^{2+1} - \frac{7}{1+1}x^{1+1} + 5x\Big|_1^3$$

$$\frac{1}{3}x^3 - \frac{7}{2}x^2 + 5x\Big|_1^3$$

Evaluate the antiderivative at the upper limit, then subtract the value of the antiderivative at the lower limit.

$$\frac{1}{3}(3)^3 - \frac{7}{2}(3)^2 + 5(3) - \left(\frac{1}{3}(1)^3 - \frac{7}{2}(1)^2 + 5(1)\right)$$

$$9 - \frac{63}{2} + 15 - \frac{1}{3} + \frac{7}{2} - 5$$

$$19 - \frac{56}{2} - \frac{1}{3}$$

$$19 - 28 - \frac{1}{3}$$

$$-9 - \frac{1}{3}$$

$$-\frac{27}{3} - \frac{1}{3}$$

$$-\frac{28}{3}$$