

1. Evaluate the following indefinite integrals.

a. $\int 2 \sin(2x) - \frac{1}{4} \sec^2(x) dx$

b. $\int 4x^2 + 2e^{2-3x} dx$

2. Beginning at $t = 0$ seconds with initial velocity 4 meters per second, a particle moves in a straight line with acceleration $a(t) = 3t^{1/2}$ meters per second squared. Find the distance traveled after 25 seconds.

3. Evaluate the definite integrals using FTC 1.

a. $\int_{-1}^4 2x^3 - 6x + 3 dx$

b. $\int_{1/2}^1 \frac{3t^{1/3} - 2t^{-1/3}}{t} dt$

$$\text{c. } \int_{\pi/6}^{5\pi/6} \sin(2x) \, dx$$

$$\text{d. } \int_1^4 x^2 + \frac{3}{x} \, dx$$

4. Calculate the following derivatives:

$$\text{a. } \frac{d}{dx} \int_{-1}^x \tan^{-1}(t^2 - 1) \, dt$$

$$\text{b. } \frac{d}{dv} \int_2^{2/v} \frac{x}{1-x^2} \, dx$$

5. Find the displacement over the time interval $[1, 6]$ of a helicopter whose (vertical) velocity at time t is $v(t) = 0.02t^2 + t$ meters per second.