

Find the indefinite integrals:

1. $\int x^9 dx$

2. $\int (t^3 + 4t^2 - 8t + 3) dt$

3. $\int \frac{9}{\sqrt{t}} dt$

4. $\int \frac{9x^5 + 5x^3 - 4x + 1}{x^3} dx$

5. $\int t^5 \left(1 + 3t - \frac{2}{t} \right) dt$

6. $\int \left(e^x + \frac{1}{x} \right) dx$

1. Use the fundamental theorem of calculus to evaluate the definite integrals:

a. $\int_0^8 (4x - 7) dx$

b. $\int_1^2 (4x - 7) dx$

c. $\int_1^T \left(\frac{x+1}{x^4} \right) dx$

d. $\int_4^x (e^t + \sqrt{t}) dt$

2. Use the fundamental theorem of calculus to find $F'(x)$ for

a. $F(x) = \int_2^x \sqrt{t^3 + 5t - 8} dt.$

b. $F(x) = \int_8^{5x^2+20} (\ln t)^3 dt$

3. Find the value of x for which $F(x) = \int_{-8}^x (|t| + 200) dt$ takes its maximum on the interval $[-8, 40]$.

1. Find the definite integrals using the fundamental theorem of calculus. You may need to use a substitution.

a. $\int_0^x e^t dt$

b. $\int_0^x (t+3)^2 dt$

c. $\int_0^x \sqrt{t+9} dt$

d. $\int_0^x \frac{3}{(4t+5)} dt$

e. $\int_0^x 6e^{3t-2} dt$

f. $\int_0^x 3t^2 e^{t^3+2} dt$

2. Consider the function $F(x) = \int_{-2}^x \frac{1}{1+t^2} dt$.

Determine the intervals on which $F(x)$ is increasing.

3. Find the average value of $g(x) = e^{2x}$ on the interval $[1, 4]$.

4. A rock is dropped from a cliff. The velocity of the rock, measured in feet per second, after t seconds, is $v(t) = -32t$. The rock hits the ground 10 seconds later. How high is the cliff?