

1. Find the exact value of the following logarithmic expressions:

(a) $\log_2(32)$

(c) $\log_5(1)$

(b) $\log_3\left(\frac{1}{27}\right)$

(d) $\log_4 32$

2. Use the laws of logarithms to simplify the expression: $\ln\left(\frac{x^2(x-1)^{\frac{5}{2}}}{(x-4)^3}\right)$

3. (a) Suppose you invest \$10,000 in a savings account that pays 3% annual interest compounded monthly. How much money will be in the account after 6 years?

(b) How long would it take \$5,000 invested at 6% annual interest compounded continuously to triple?

(c) Find the interest rate needed for an investment of \$2,000 to double in 6 years if the interest is comounded quarterly.

4. Compute the derivatives of the following functions. You do not need to simplify your answers.

(a) $f(x) = e^{3x^2}$

(b) $g(x) = \ln(3x^2 - 4x + 6)$

(c) $h(x) = (x^2 + 1)e^{x^2+1}$

(d) $k(x) = x^2 \ln(e^x + 1)$

(e) $l(x) = (3x^2 + 1)^5(x^2 - 1)^{\frac{3}{2}}(4x + 3)^{\frac{5}{3}}$

5. Find the tangent line to $f(x) = x \ln(2x)$ when $x = \frac{1}{2}$

6. Find the absolute extrema of $g(t) = t^2 e^{2t}$ on the interval $[-2, 2]$.

7. Evaluate the following integrals:

(a) $\int 6x^3 - 4x^{\frac{1}{2}} dx$

(b) $\int \frac{4x^3 - 3x^2 + 2x}{2x^2} dx$

(c) $\int_{-1}^1 3x^5 - 4x^3 dx$

(d) $\int_0^4 e^{3x} + x^{-\frac{1}{2}} dx$

8. Find the average value of $f(x) = x^2 - \frac{1}{x^2}$ for $1 \leq x \leq 3$.

9. Find the area of the region enclosed by the graphs $f(x) = x^2 - 4$ and $g(x) = 4 - x^2$.