1. Find the derivative of the following functions. You do not need to simplify.

   (a) \( f(x) = (e^x + e^{-3x})^2 \)

   (b) \( g(x) = e^{5x+7} \frac{x}{x} \)

   (c) \( h(x) = e^{x^2+5x} \)

   (d) \( k(x) = xe^{-2x} + e^{x/2} \)

   (e) \( f(x) = 3x^2 - 6 \)

2. Find the derivative of the following functions. You do not need to simplify.

   (a) \( f(x) = \frac{\ln(x^5)}{x^2} \)

   (b) \( g(x) = (\ln 4x)^9 \)

   (c) \( h(x) = \ln(3x^2 - 5)^4 \)

   (d) \( k(x) = x^3 \ln x - \ln(x^2 + 1) \)

   (e) \( f(x) = \log_6(4x^3 + 2) \)

3. If a college education costs $50,000 how much money should the parents deposit in a trust fund paying 8% interest compounded quarterly to ensure sufficient funds at age 18?

4. Find the derivative of the following functions. You do not need to simplify.

   (a) \( f(x) = \ln(e^x - 3x) + x \ln x \)

   (b) \( g(x) = \ln e^{2x} + e^x \ln 3x \)

5. Find the relative rate of change for

   \[ f(t) = 4 + 1.2e^{0.01t}. \]

6. Consumer demand for a commodity is

   \[ D(p) = 400e^{-0.01p} \]

   per month, where \( p \) is the selling price in dollars. Find the selling price that maximizes consumer expenditure.

7. A bank offers 7% interest compounded continuously. How many years will it take the deposit to triple?

8. A toy dealer wants to increase revenue by increasing the price of its best selling toy. If the demand for this toy is

   \[ D(p) = 9,000 - 30p^2, \]

   where \( p \) is the price of the toy in dollars, and if the toy’s current price is $7, use elasticity of demand to determine whether the increase will succeed.
1. (a) $f'(x) = 2(e^x + e^{-3x})(e^x - 3e^{-3x})$

(b) $g'(x) = \frac{x \cdot e^{5x+7}(5) - 3^{5x+7}(1)}{x^2}$

(c) $h'(x) = e^{x^2+5x}(2x + 5)$

(d) $k'(x) = x \cdot (-2e^{-2x}) + e^{-2x}(1) + \frac{1}{2}e^x/2$

(e) $f'(x) = 3x^2-6(2x)(\ln 3)$

2. (a) $f'(x) = \frac{x^2 \cdot 5x^4 - 2x \ln x^5}{x^4}$

(b) $g'(x) = 9(\ln 4x)^8 \frac{4}{4x}$

(c) $h'(x) = 4\left(\frac{6x}{3x^2-5}\right)$

(d) $k'(x) = x^3 \cdot \frac{1}{2} + 3x^2 \ln x - \frac{2x}{x^2+1}$

(e) $f'(x) = \frac{12x^2}{(\ln 6)(4x^3+2)}$

3. $12,015.94$

4. (a) $f'(x) = \frac{e^x - 3}{e^x - 3x} + x \cdot \frac{1}{x} + \ln x$

(b) $g'(x) = \frac{2e^{2x}}{e^{2x}} + e^x \cdot \frac{3}{3x} + e^x \ln 3x$

5. $\frac{f'(t)}{f(t)} = \frac{0.12e^{0.01t}}{4 + 1.2e^{0.01t}}$

6. $100$

7. 15.69 years

8. increase will succeed