1. Calculate $f'(x)$ for each function below. After computing the derivative, do not simplify your answer.

   (a) $f(x) = \sqrt{2x} + 3x^2 + e^4$
   (b) $f(x) = \frac{4}{x} + \ln(4)$
   (c) $f(x) = \frac{8x^4 - 5x^{1/3} + 1}{x^2}$
   (d) $f(x) = \frac{x^2 + 3}{x - 1}$
   (e) $f(x) = x^3e^x$
   (f) $f(x) = \sqrt{x} \cos(x) - e^x \sin(x)$
   (g) $f(x) = \frac{\tan(x) + 9x^2}{\ln(x) - 4x}$
   (h) $f(x) = \frac{x \sin(x)}{1 - e^x \cos(x)}$

2. Use the quotient rule to prove a derivative rule for $f(x) = \cot(x)$.

3. Find the $x$-coordinate of each point on the graph of the given function where the tangent line is horizontal.

   (a) $f(x) = \frac{1}{x^2} - \frac{1}{x^3}$
   (b) $f(x) = \frac{1}{\sqrt{x}}(x + 9)$
   (c) $f(x) = (x^2 - 8)e^x$

4. Find equations for two tangent lines to the graph of $f(x) = \frac{3x + 5}{x + 1}$ that are perpendicular to the line $2x - y = 1$.

5. Find all points $P$ on the graph of $y = 4x^2$ with the property that the tangent line at $P$ passes through the point $(2, 0)$.