1. (2 pts) Find the derivative of $f(x) = 3x^2 - 6x + 1$ using the definition: $f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$
2. If $f(x) = 5x^3 - 2x^2 - x + 3$, then it will soon be shown that its derivative is

$$f'(x) = 15x^2 - 4x - 1.$$  

(a) (1 pt) Find the slope of the tangent line to the graph of $y = f(x)$ at $x = -1$.

(b) (1 pt) Find the equation of the tangent line to the graph of $y = f(x)$ at $x = -1$.

(c) (2 pts) Find the value(s) of $x$ at which the graph of $y = f(x)$ has a tangent line having slope 3.
3. If \( f(x) = \frac{x^2 + 5x - 1}{x - 3} \), then it will soon be shown that its derivative is

\[
f'(x) = \frac{x^2 - 6x - 14}{(x - 3)^2}.
\]

(a) (1 pt) Find the equation of the tangent line to the graph of \( y = f(x) \) at the point \((4,35)\).

(b) (2 pts) Find the value(s) of \( x \) at which the graph of \( y = f(x) \) has a horizontal tangent.
4. If \( f(x) = \frac{x - 1}{x + 2} \), then it will soon be shown that its derivative is

\[
f'(x) = \frac{3}{(x + 2)^2}.
\]

(a) (1 pt) Find the equation of the tangent line to the graph of \( y = f(x) \) at the point \( (4, \frac{1}{2}) \).

(b) (2 pts) Find the value(s) of \( x \) at which the graph of \( y = f(x) \) has a tangent line having slope 1.
5. (2 pts) If \( f(x) = x^4 - \frac{8}{3}x^3 - \frac{3}{2}x^2 + 6x - 7 \), then it will soon be shown that its derivative is

\[
f'(x) = 4x^3 - 8x^2 - 3x + 6.
\]

Find the value(s) of \( x \) for which the tangent line is horizontal.

6. (1 pt) If \( f(x) = \ln(x^2 + 4) \), then it will soon be shown that its derivative is

\[
f'(x) = \frac{2x}{x^2 + 4}.
\]

Find the value(s) of \( x \) at which the graph of \( y = f(x) \) has a tangent line having slope \( \frac{1}{2} \).