(1) Use a linear approximation at $x = 1$ to approximate the value of $\sqrt{1.1}$.

(2) Suppose the linear approximation for a function $f(x)$ at $a = 2$ is given by the tangent line $y = -3x + 11$. If $g(x) = (f(x))^2$, find the linear approximation for $g(x)$ at $a = 2$. 
[Maximum and Minimum Values]

(3) Find the absolute maximum and absolute minimum values of $f$ on the given interval.

(a) $f(x) = 10 + 4x - x^2$, $[0, 5]$

(b) $f(x) = (x^2 - 4)^3$, $[-1, 3]$
(c) \( f(x) = 2 \cos x + \sin 2x, \quad [0, \pi/2] \)
(4) Find the number \( c \) that satisfies the conclusion of the Mean Value Theorem on the given interval.

(a) \( f(x) = 2x^2 - 3x + 1, \quad [0, 2] \)

(b) \( f(x) = \ln x, \quad [1, 4] \)
[How Derivatives Affect the Shape of a Graph]

(5) Sketch a curve satisfying the following conditions.

(a) The domain of \( f(x) \) is all real numbers.
(b) \( f(2) = -2, f(0) = 0, f(4) = 2, f'(2) = 0 \).
(c) \( f'(x) < 0 \) if \( 0 < x < 2 \), \( f'(x) > 0 \) if \( x > 2 \).
(d) \( f''(x) < 0 \) if \( 0 \leq x < 1 \) or if \( x > 4 \).
(e) \( f''(x) > 0 \) if \( 1 < x < 4 \).
(f) \( \lim_{x \to \infty} f(x) = 2 \).
(g) The graph of \( f(x) \) is symmetric about the \( y \)-axis.
(6) Sketch the graph of \( f(x) = \frac{x}{x^2 - 4} \) by locating intervals of increase/decrease, local extrema, concavity, and inflection points.