First some notation. Let \( f(x) \) be a real-valued function; then its first derivative is denoted by \( f'(x) \) or \( \frac{d}{dx} f(x) \) and its second derivative by \( f''(x) \) or \( \frac{d^2}{dx^2} f(x) \).

1. Let \( f(x) = 120 - \left(\frac{x}{4}\right)^2 \). (a) Calculate \( f(20) \). (b) Calculate \( f'(x) \). (c) Calculate \( f'(20) \).
   (d) Calculate \( f''(x) \). (e) Calculate \( f''(20) \).

2. Let \( f(x) = 6x^3 \). (a) Calculate \( f(3) \). (b) Calculate \( f'(x) \). (c) Calculate \( f'(3) \).
   (d) Calculate \( f''(x) \). (e) Calculate \( f''(3) \).

3. Let \( f(x) = 12\sqrt{x} \). (a) Calculate \( \frac{d}{dx} f(x) \). (b) Calculate \( \frac{d^2}{dx^2} f(x) \).

4. Let \( f(x) = 2 \ln \left(\frac{x}{2}\right) \), where \( \ln \) denotes the natural logarithm (that is, the logarithm to the base \( e \)).
   (a) Calculate \( \frac{d}{dx} f(x) \). (b) Calculate \( \frac{d^2}{dx^2} f(x) \).

5. Let \( f(x) = x(60 - 2x) - 4x \). Find the value of \( x \) that maximizes the function \( f \).

6. Let \( f(x) = 200 - \left(\frac{x}{2}\right)^2 \). (a) Draw the graph of the function \( f \) for \( x \in [0, 400] \).
   (b) Write the equation of the straight line that is tangent to the graph of \( f \) at the point \( x = 100 \).