All quizzes will be graded out of 10 possible points. The possible points for each question is in parentheses after the question number.

1. (6) Quick Calculations! Find the derivative for each of the given functions. Write your answer in the space provided. Only your answer will be graded.

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

Combine the chain rule with basic derivative rules:

\[
 f'(x) = \frac{d}{dx}[e^{2x} - \ln x] = e^{2x} \cdot \frac{d}{dx}[2x] - \frac{1}{x} = 2e^{2x} - \frac{1}{x}
\]

(b) \( g(x) = x \cdot \cos(x) \)

Use the Product Rule:

\[
 g'(x) = \frac{d}{dx}[x \cos(x)] = \cos(x) \cdot \frac{d}{dx}[x] + x \cdot \frac{d}{dx}[\cos(x)] = \cos(x) - x \sin(x)
\]

(c) \( h(x) = \frac{x^2 - 1}{x} \)

You can use algebra or the quotient rule.

Algebra:

\[
 h(x) = \frac{x^2 - 1}{x} = \frac{x^2}{x} - \frac{1}{x} = x - x^{-1}. \text{ So } h'(x) = 1 + x^{-2}
\]

Quotient Rule:

\[
 h'(x) = \frac{d}{dx} \left[ \frac{x^2 - 1}{x} \right] = \frac{x \cdot \frac{d}{dx}[x^2 - 1] - (x^2 - 1) \cdot \frac{d}{dx}[x]}{x^2} = \frac{x \cdot 2x - (x^2 - 1) \cdot 1}{x^2} = 1 + x^{-2} = \frac{x \cdot 2x - (x^2 - 1) \cdot 1}{x^2}
\]

2. (4) For the function \( f(x) = (x^2 + 2x - 2)^5 \), find the slope of the line that is tangent to the graph of \( f \) when \( x = 1 \). Show your work to receive full credit.

The derivative of \( f \) evaluated at the input \( x = 1 \) gives the slope of the line that is tangent to the graph. Use the chain rule to find the derivative:

\[
 f'(x) = 5(x^2 + 2x - 2)^4 \cdot \frac{d}{dx}[x^2 + 2x - 2] = 5(x^2 + 2x - 2)^4 \cdot (2x + 2)
\]

Then \( f'(1) = 5(1^2 + 2 \cdot 1 - 2)^4 \cdot (2 \cdot 1 + 2) = 5 \cdot 1^4 \cdot 4 = 20 \) is the desired slope.