RULES FOR PART 1 OF THIS TEST:
• No calculators allowed!
• You do not need to simplify your answers.
• Put your final answer in the box provided.
• Show all of your work for each problem.

1. (42 points) Complete each boxed equation with the appropriate formula for the derivative.

   (a) If \( y = 10x^6 - 3x^2 + \frac{1}{x^3} \), then

   \[
   D_x y =
   \]

   (b) If \( w = \cos(t^3 + 1) \), then

   \[
   \frac{dw}{dt} =
   \]
(c) If \( f(x) = \sqrt[3]{x} + \frac{1}{\sqrt{x}} \), then

\[
f'(x) =
\]

(d) If \( g(t) = \frac{t^5 + 3t}{t^2 + 1} \), then

\[
g'(t) =
\]
(e) If \( f(x) = (x^4 + 1) \cdot \tan(x) \), then

\[
f'(x) =
\]

(f) If \( f(t) = \sin^2(t^2 + 5) \), then

\[
f'(t) =
\]
2. (14 points) Complete the boxed equation with the appropriate formula for the derivative. Note that you will need to take a higher order derivative for part (a) and use implicit differentiation for part (b).

(a) If \( f(x) = x^3 - 4x^2 + 5x \), then

\[
f''(x) =
\]

(b) If \( 2y = x^2 + \sin(y) \), then

\[
\frac{dy}{dx} =
\]
3. (9 points) Find the equation of the line tangent to the graph of \( f(x) = x^2 + 2x \) at \( x = 2 \). Put your final answer in the box provided.