No calculators allowed. Simplify and circle each final answer.

1. (6 points) Find derivatives of each of the following functions. You should always use proper notation. Your final answer should be in the form of an equation where the right hand side is your derivative formula, and the left hand side is the notation for your derivative.

(a) \( g(t) = 5t^6 - 4t^3 + 9t - 27 \)

\[
g'(t) = 30t^5 - 12t^2 + 9
\]

(b) \( y = 2e^x - 3x^3 + 5 \ln(x) \)

\[
\frac{dy}{dx} = 2e^x - 3x^3 \ln 3 + 5 \cdot \frac{1}{x}
\]

(c) \( w = \frac{4}{r^2} + \frac{1}{2\sqrt{r}} \)

\[
w = 4r^{-2} + \frac{1}{2}r^{-1/3}
\]

\[
\frac{dw}{dr} = 4 \left(-2r^{-3}\right) + \frac{1}{2} \left(-\frac{1}{3}r^{-4/3}\right)
\]

\[
\frac{dw}{dr} = -8r^{-3} - \frac{1}{6}r^{-4/3}
\]
2. (2 points) The population of feral pigs on an island is \( P = 3t^2 + 2000 \) where \( t \) is measured in years since October 3, 1998.

(a) How many feral pigs live on the island today?

\[ P(10) = 3(10)^2 + 2000 = 2300 \text{ feral pigs} \]

(b) How quickly is the population increasing today?

\[ P' = 6t \]

\[ P'(10) = 6(10) = 60 \text{ feral pigs per year} \]

3. (2 points) Using the axes below the graph of \( f(x) \), sketch a graph of \( f'(x) \).

![Graph of f(x) and f'(x)]