1. (5 points) It has been raining heavily since midnight. Let $f(t)$ represent the total number of inches of rain which have fallen in the $t$ hours since midnight. Given that $f'(2) = 4$, which one of the following sentences must be true?

(a) From midnight to 2:00AM it rained a total of 4 inches.
(b) From midnight to 4:00AM it rained a total of 2 inches.
(c) From midnight to 2:00AM it was raining at an average rate of 4 inches per hour.
(d) From midnight to 4:00AM it was raining at an average rate of 2 inches per hour.
(e) At 2:00AM it was raining at a rate of 4 inches per hour.
(f) At 4:00AM it was raining at a rate of 2 inches per hour.

2. A model for the population of a town predicts the population $t$ years from now to be given by $P(t) = 850e^{-0.04t}$.

(a) (1 point) What population does this model predict for this town 15 years from now?

(b) (2 points) How quickly in people per year is the population predicted to be changing 15 years from now?
3. (2 points) Find the equation of the line tangent to the graph of \( y = x^3 - 10x \) at \( x = 2 \).

4. (3 points) Find derivatives of the following functions. Use Leibniz notation for the derivative.

(a) \( y = \ln \left( 2x^5 + 8x^2 + 15 \right) \)

(b) \( h = \frac{9}{r^3} \)

(c) \( P = 4t^3 e^{-t} \)