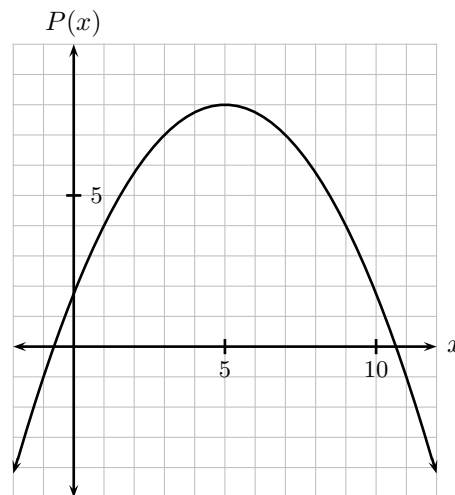**Indicate clearly and neatly how you obtain all of your answers on this assignment, doing your work on additional paper.**

1. Suppose we have the profit function

$$P(x) = -0.25x^2 + 2.5x + 1.75$$

(which is not particularly realistic), with x being the number of units sold and P being the profit, in dollars. The graph of the function is shown to the right.

   (a) Find that average rate of change of profit from $x = 3$ to $x = 9$. **Give your answer with correct units**. I should have been emphasizing this all along, but haven't. You should get your answer from computing a fraction, and the correct units should be the units for the top divided by (or "per") the units on the bottom.

   (b) Find the equation of the secant line through the points on the graph where $x = 3$ and $x = 9$. You do not need to re-do anything in part (a) that is of use.

   (c) **Neatly** draw in the secant line whose equation you just found on the graph. **Label it as Line 1.**

2. Continue using the profit function from Exercise 1.

   (a) Determine that marginal profit for the third unit.

   (b) Give the derivative of the profit function, then use it to approximate the marginal profit for the third unit.

   (c) Determine the percent error between the actual marginal profit and the approximation from the derivative.

   (d) Find the equation of the tangent line to the graph of the function at $x = 3$.

   (e) **Neatly** draw in the secant line whose equation you just found on the graph. **Label it as Line 2**.

3. Find the equation of the tangent line to $y = x^3 - 5x - 1$ at $x = 2$.

4. Find the limit $\lim\limits_{x \to \infty} \dfrac{2x + 3}{x^2 - 4x + 2}$, showing steps as we did in class on Friday, 2/26.