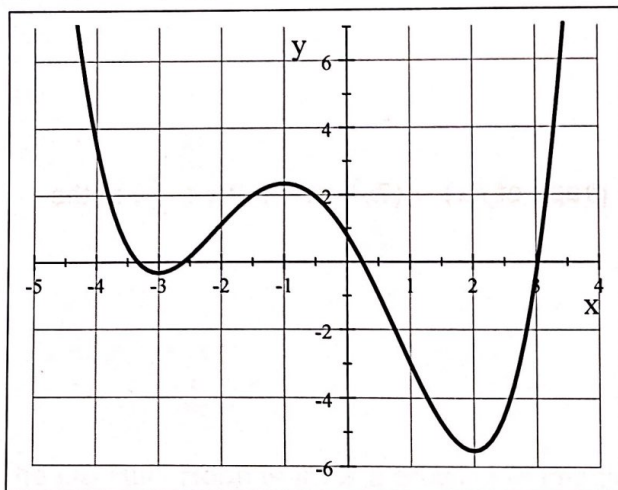


Name: _____ Score: ____/20

Due: Wednesday, April 15 11:59pm Denver timh.

Show work/explain thinking!

1. [4pts] Consider the following graph of a function $f(x)$. Answer the questions below and to the right



- a) Draw the tangent line to $y = f(x)$ where $x = -2$ on the graph.

- b.) Identify points where the tangent line is horizontal (draw in the horizontal tangent lines) and write the down the x values here:

- c) Make an educated guess (estimate) of the value of $f'(-2)$ using the graph. Show your work and explain your reasoning.

2. [6pts] The manufacturer of Bobble Boats estimates that the total profit realized from the sale and manufacture of x SuperBoats is given by $P(x) = -2x^2 + 52x - 108$, where $P(x)$ is measured in thousands of dollars. Show your work on this problem. Answers without work earn 0 points.

- a. What is the average rate of change of the profit realized when 10 to 15 boats are sold? Give an answer with correct units.
- b. What is the instantaneous rate of change of the profit realized when precisely 10 boats are sold? Also, what is the instantaneous rate of change of the profit when 15 boats are sold? Give your answers with correct units.

- c. The sign (+ or -) of your two answers in part b are not the same. Explain what that means (namely, when the sign was positive, what does that tell you about the profit, and when the sign was negative, what does that tell you?)
- d. When is the profit **changing faster**, when the manufacturer sells 10 or 15 super boats? Explain how you know.
3. [5pts] Find the equation of the tangent line to the graph of $f(x) = (7x^3 - x - 1)(9x + \frac{2}{x})$ at the point on the graph where $x = -1$.
4. [3pts] Find the point (x, y) on the graph of $g(x) = \frac{1}{16}x^2 + \frac{1}{x} + \frac{1}{2}$, where the tangent line to the graph is horizontal. (Using calculus, not a graph).
5. [2pt] If $g(x)$ computes the number of total hours you have spent doing online classwork x weeks after the start of the spring quarter, interpret what the value $g'(4) = 5$ would mean. Give an answer as a sentence with correct units. Tell me whether you think that value will be realistic for you.