1. Given the following graph of the first derivative $f'(x)$, answer the questions.
    a. On what interval(s) is $f'(x)$ negative?
    b. On what interval(s) is $f(x)$ increasing?
    c. On what interval(s) is $f(x)$ concave up?
    d. On what interval(s) is $f''(x)$ negative?
    e. Which is bigger $f(2)$ or $f(4)$? How can you tell?
    f. Estimate any point(s) where $f(x)$ has a local maximum. How can you tell?

2. Find the equation of the tangent line to the graph of
   
   $$f(x) = 3x^4 - 5x^3 + 10$$
   when $x = 2$. 

3. The following is a graph of marginal revenue and marginal cost for some good. Use the graph to decide whether cost, revenue, and profit are increasing, decreasing, or constant when \( q = 100 \). Fill in the blanks below. Explain your answers.

![Graph of marginal revenue and marginal cost](image)

a. Cost is ____________________. We can tell because

b. Revenue is ____________________. We can tell because

c. Profit is ____________________. We can tell because

4. Find the derivative \( f'(x) \).

\[
f(x) = 3\sqrt{x} + \frac{2}{x^8} + \frac{4}{3x}
\]

5. Find the derivative \( f'(x) \).

\[
f(x) = \frac{2}{7x^3} + 6\ln x + 5^x
\]
6. Find the derivative $f'(x)$.
   
   $f(x) = (x^5 - 6x^3 + 7)^8$

7. Find the derivative $f'(x)$.
   
   $f(x) = 8^{x^3 - 3x^2 + x}$

8. Find the derivative $f'(x)$.
   
   $f(x) = \ln(5x^4 - 9x + 3)$

9. A model for the attendance, $A$, at a local fair is given by
   
   $A(t) = -4t^3 + 60t^2$ people,

   where $t$ is hours since 9AM when the gates open.

   a. At what rate is the attendance changing at 2PM? Give units. Is the attendance increasing or decreasing?

   b. At what time(s) will attendance be increasing at a rate of 252 people/hour?

   No points will be awarded for guess and check answers. Show how to solve algebraically!