Math 112, Spring 1999  Supplementary Worksheet #7: Optimization

To the right you’ll find a sketch of the portion of the graph of the function

\[ y = f(x) = 3x^4 - 40x^3 + 126x^2 \]

where \( x \) ranges from \(-3\) to 10.

1. Compute \( f'(x) \) and \( f''(x) \).

2. (a) Find all \( x \) values where \( f(x) \) has a horizontal tangent line.
   (b) What are the corresponding \( y \) values?
   (c) What are the corresponding values of \( f''(x) \)? Which are positive and which are negative?

3. Find the maximum value of \( f(x) \) on the interval \( x = -1 \) to \( x = 8 \). Mark the point on the graph above.

4. Find the maximum value of \( f(x) \) on the interval \( x = -2 \) to \( x = 8 \). Mark the point on the graph above.

5. Find the minimum value of \( f(x) \) on the interval \( x = -1 \) to \( x = 5 \). Mark the point on the graph above.

6. Find the minimum value of \( f(x) \) on the interval \( x = 2 \) to \( x = 9 \). Mark the point on the graph above.