Homework 10, Graded Problems, M170-001

Part I. Suppose that $f(x)$ is a function with $f(0) = 2$.

1. (ME) Suppose that $f'(x) > 0$ for all $x$ in $(0, 3)$. Sketch the graph of $f$ on the interval $(0, 3)$.
2. Now suppose that $f'(x) > 0$ for all $x < 0$. Extend your graph of $f$ to the left edge of the page.
3. Assume that $f'(x) < 0$ on $(3, 6)$. Extend your graph to all of $(-\infty, 6)$.
4. Assume that $f'(x) > 0$ on $(6, \infty)$. Finish your graph of $f(x)$.
5. List the intervals on which $f$ is increasing.
6. List the intervals on which $f$ is decreasing.
7. Find where $f$ has a local minimum.
8. Find where $f$ has a local maximum.

Part II. Suppose that $f$ is the same function as in Part I, begin a new graph of $f$ as follows:

1. (ME) Suppose that $f''(x) > 0$ on $(0, 2)$. Sketch the graph on $(0, 2)$.
2. Suppose that $f''(x) < 0$ on $(2, 3)$. Continue the graph up to $x = 3$.
3. If $f''(x) < 0$ on $(3, 5)$, continue the graph out to $x = 5$.
4. Assuming $f''(x) > 0$ on $(5, \infty)$, extend the graph to infinity.
5. Assume that $f''(x) < 0$ on $(-\infty, 0)$. Complete the graph of $f$.
6. List the intervals on which $f$ is concave up.
7. List the intervals on which $f$ is concave down.
8. Find where $f$ has inflection points.

Part III. Suppose that $g$ is a function that is

- increasing on $(2, \infty)$
- decreasing on $(-\infty, 2)$
- concave up on $(-\infty, -2)$ and $(0, \infty)$
- concave down on $(-2, 0)$

Assume also that $g'(x) = 0$ at $x = -2$ and $x = 2$, and that $g(2) = -4$. Sketch a graph of $g$ that clearly conveys all of the above information.