**Section 4.3: How Derivatives Affect the Shape of a Graph**

(1) In this section, we learn how to use the first and second derivative of a function to understand the shape of its graph. Fill out the table below as completely as possible.

| $f$ | $f'$ | $f''$ |
|---|---|---|
| postive | | |
| negative | | |
| | postive | |
| | 0 or undefined | |
| | negative | |
| | | postive |
| | | 0 or undefined |
| | | negative |

(2) When looking for local minimum or maximum, what points do we need to check? How to do know if we have a local minimum or local maximum?

(3) What is the definition of an inflection point? How does this definition compare to the definition of a critical point?

(4) How can we use the second derivative of a function to determine if a critical point is a local min or max? When does this test fail?

(5) When we are looking for increasing/decreasing intervals (or concave up/concave down intervals) we find the points where the derivative (second derivative) is 0 or undefined. When use these values to split our domain into intervals. Then what do we do? What numbers do we plug in where? Why does this work? Why do we know that on those intervals the function is either always increasing or always decreasing (concave up/concave down)?

(6) Draw segments of graphs of functions in each of the following cases:

| | |
|---|---|
| increasing, concave up | increasing, concave down |
| decreasing, concave up | decreasing concave down |

Extra Practice in Book: 4.3: 3, 4, 5, 6, 7, 8, 11, 17, 19, 24, 29, 33, 35, 43, 57,