MAT 161 Problem Session #4 Names:____

Problems

1. Fill in the blanks below with one of these expressions:

$$f' \leq 0 \quad f' \geq 0 \quad f' < 0 \quad f' = 0 \quad f' > 0$$

$$f'' \leq 0 \quad f'' \geq 0 \quad f'' < 0 \quad f'' = 0 \quad f'' > 0$$

   (a) If the f-graph is decreasing on the interval (a, b), then ________________ on the interval (a, b).

   (b) If ________________ on the interval (a, b), then the f-graph is increasing on (a, b).

   (c) If $x = a$ is a local maximum point on the f-graph, then ________________ at $x = a$.

   (d) If the f-graph is concave up on the interval (a, b), then ________________ on the interval (a, b).

   (e) If ________________ on the interval (a, b), then f is concave down on (a, b).

   (f) If $x = a$ is an inflection point on the f-graph, then ________________ at $x = a$.

2. Sketch a graph of a single function $f(x)$ satisfying the following:

$$f(-2) = 3$$
$$f'(-2) = f'(0) = f'(5) = 0$$
$$f'(x) < 0 \text{ for } x < -2,\ 0 < x < 5, \text{ and } x > 5$$
$$f'(x) > 0 \ \textit{for} \ -2 < x < 0$$

3. Explain why each of the following statements is FALSE. (The easiest way to do this is to provide me with a so-called *counterexample*—in other words an example that shows the falsity of the statement. Your counterexample can be a graphical example—in other words, you don't need to find a formula for your example.)

(a) If $f'(4) = 0$ then the f-graph has a local extreme point (max or min) at $x = 4$.

(b) If $f''(4) = 0$, then the f-graph has an inflection point at $x = 4$.