NAME:___________________

CALCULUS – Chapter 3.3 Review

Complete the following statements about the first and second derivative tests.

1. When the first derivative equals zero, ____________________________ occur.

2. When the first derivative changes sign, ______________________________ occur.

3. When the first derivative is ___________________, f(x) is ___________________.

4. When the first derivative is ___________________, f(x) is ___________________.

5. When the second derivative changes sign, ____________________________ occur.

6. When the second derivative is ___________________, f(x) is ___________________.

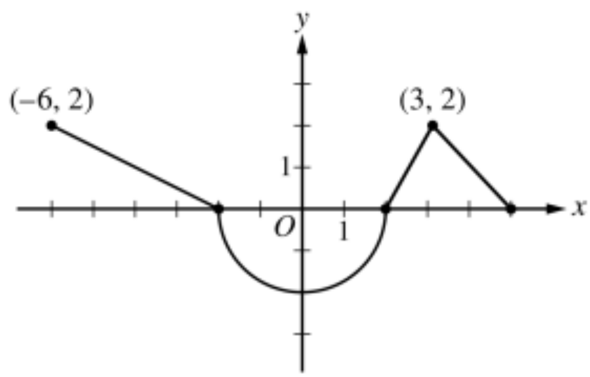
7. When the second derivative is ___________________, f(x) is ___________________.

8. Concavity can also be determined using the graph of f'(x). f(x) is concave up when the graph of f'(x) is _______________________ and concave down when f'(x) is _________________________.

9. Sketch a graph of f(x) that is only increasing, but contains both intervals of concave up and concave down.

10. Sketch an example of what the graph of f'(x) might look like given your graph of f(x).

11.



Graph of f'

The function f is differentiable on the closed interval $[-6, 5]$ and satisfies $f(-2) = 7$. The graph of f', the derivative of f, consists of a semicircle and three line segments, as shown in the figure above.

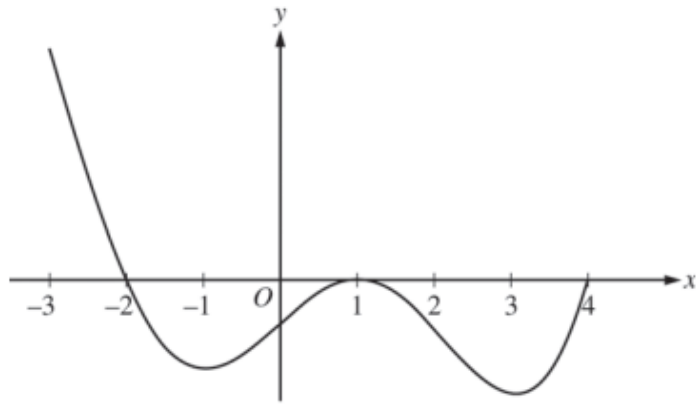
(a) Find the values of $f(-6)$ and $f(5)$.

(b) On what intervals is f increasing? Justify your answer.

(c) Find the absolute minimum value of f on the closed interval $[-6, 5]$. Justify your answer.

(d) For each of $f''(-5)$ and $f''(3)$, find the value or explain why it does not exist.

12.



Graph of f'

The figure above shows the graph of f', the derivative of a twice-differentiable function f, on the interval $[-3, 4]$. The graph of f' has horizontal tangents at $x = -1$, $x = 1$, and $x = 3$. The areas of the regions bounded by the x-axis and the graph of f' on the intervals $[-2, 1]$ and $[1, 4]$ are 9 and 12, respectively.

(a) Find all x-coordinates at which f has a relative maximum. Give a reason for your answer.

(b) On what open intervals contained in $-3 < x < 4$ is the graph of f both concave down and decreasing? Give a reason for your answer.

(c) Find the x-coordinates of all points of inflection for the graph of f. Give a reason for your answer.