Math 1242 ______________________________

Review

1. Assume the functions described below have both a first derivative and a second derivative everywhere. Answer each of the following using the appropriate response from POSITIVE, NEGATIVE, ZERO, or CANNOT DETERMINE

   a. If f is increasing at x=3, then

      $f'(3) =$ ________ $f''(3) =$ ________

   b. If f has a relative maximum at x=7, then

      $f'(7) =$ ________ $f''(7) =$ ________

   c. If f has a relative minimum at x=-6, then

      $f'(-6) =$ ________ $f''(-6) =$ ________

   d. If f is decreasing at x=32, then

      $f'(32) =$ ________ $f''(32) =$ ________

   e. If f has an inflection point at x=41, then

      $f'(41) =$ ________ $f''(41) =$ ________

2. Assume that f is differentiable everywhere and

   $f'(0) = 8/9$ $f''(0) = -2$ $f'(2) = 1/4$

   $f'(3) = 0$ $f''(3) = -1$ $f'(5) = -3$

   $f''(5) = 1$ $f'(7) = 0$ $f''(7) = 5/3$

   a. List two points where f is increasing.

   b. Where does f have a relative maximum?

   c. Where does f have a relative minimum?

3. Consider the function $f(x) = 3x^2 + 12x - 36$ on $[-10, 8]$

a. Find where f is increasing and where f is decreasing.

b. Find where f is concave upward and where f is concave downward.

c. List all candidates for relative maximums and relative minimums.

d. Determine:

The relative maximums________________________________

The relative minimums________________________________

e. Find the line tangent to f at x=1.

4. Differentiate each of the following functions (ie: find the derivatives).

a. $f(x) = x^5 - 3x^2 + 11$

b. $f(x) = (5x^2 + 7x + 6)^7$

c. $f(x) = \frac{7}{x^3}$

d. $f(x) = x^3(5x^2 + 7x + 6)^7$

e. $f(x) = \frac{7}{x^3}$

f. $f(x) = x^3\sin(x)$

g. $f(x) = \sin(x^3)$

h. $f(x) = \tan(x)\sec(x)$

i. $f(x) = \frac{(x^2+x)^4}{3x+1}$

j. $f(x) = \frac{6x^2-2x+7}{5x^2+4x+7}$

k. $f(x) = \left(\frac{x^2+1}{3x+7}\right)^3 \sin(4x)$