MATH-1150 (DUPRÉ) SPRING 2011 QUIZ 5

Wednesday 21 March 2012

DIRECTIONS

FIRST: PRINT YOUR LAST NAME IN LARGE CAPITAL LETTERS ON THE UPPER RIGHT CORNER OF EACH SHEET TURNED IN.

SECOND: PRINT YOUR FIRST NAME IN CAPITAL LETTERS DIRECTLY UNDERNEATH YOUR LAST NAME ON EACH SHEET TURNED IN.

THIRD: WRITE YOUR CORRECT SPRING 2011 MATH-1150 SECTION NUMBER DIRECTLY UNDERNEATH YOU FIRST NAME ON EACH SHEET TURNED IN.

FOURTH: Write NEATLY and CLEARLY, putting your answers in the space provided. If I cannot read it you do not get credit.

FIFTH: Any failure to follow any part of any of the above directions can result in additional loss of credit.

Suppose $f(x) = x^3 - 6x^2 + 9x$. Notice that in fact $f(x) = x(x-3)^2$, so we can use this formula to quickly calculate values of f, and we see

$$f(0) = 0, \ f(1) = 4, \ f(2) = 2, \ f(3) = 0, \ \text{and} \ f(4) = 4.$$

The calculatation of the derivative of f results in

$$f'(x) = 3x^2 - 12x + 9 = 3(x^2 - 4x + 3) = 3(x-1)(x-3).$$

The second derivative is

$$f''(x) = 6x - 12 = 6(x-2).$$

1. Give all values of x for which $f(x) = 0$.

ANSWER: $x = 0$ and $x = 3$.

2. Give all values of x for which $f'(x) = 0$.

ANSWER: $x = 1$ and $x = 3$.

3. Give all values of x for which f has a local maximum value at x.

ANSWER: $x = 1$.

4. Give all values of x for which f has an inflection point at x.

ANSWER: $x = 2$.

5. Sketch the graph of f using the information above as well as the information from problems 1,2,3,4.

The graph is a typical cubic curve which looks like an "S" turned on its side (the same shape as the curve shown in Figure 5.19 in the textbook).