MAT 201 Test 2 – Fall, 2013 Name_____
100 Points Covers Chapter 3 NO GRAPHING CALCULATORS!!!

1. (10 pts) Let $f(x) = x^3 - 3x^2 + 2x$. Find all absolute and local extremes of *f* on the interval [0, 3]. Final answers accurate to the 3rd decimal place are acceptable.

2. (10 pts) Confirm that $f(x) = x^3 - 3x^2 + 2x$ satisfies the hypotheses of the Mean Value Theorem on the interval [0, 3]. Then find all values c in (0, 3) that satisfy the conclusion of the theorem.

3. (10 pts) Let $f(x) = -2\sin(x)\cos(x) - x$. Find all local extrema in the interval $[0, 2\pi]$.

4. (10 pts) Suppose a function g satisfies all of the following properties. Sketch a graph of *g* that incorporates all of the following properties into it:

$g(1) = -2 \quad g(2) = 2 \quad g(3) = 4$
$g'(1) = 0 \quad g'(3) = 0$
$g'(x) > 0$ on $(1,3) \cup (3,\infty), \quad g'(x) < 0$ on $(-\infty, 1)$
$g''(x) > 0$ on $(-\infty, 2) \cup (3,\infty), \quad g''(x) < 0$ on $(2,3)$

5. (5 pts each) Evaluate the limits:

   a. $\lim_{x\to\infty}\left(\sqrt{9x^2 + 3x + 7} - 3x\right)$

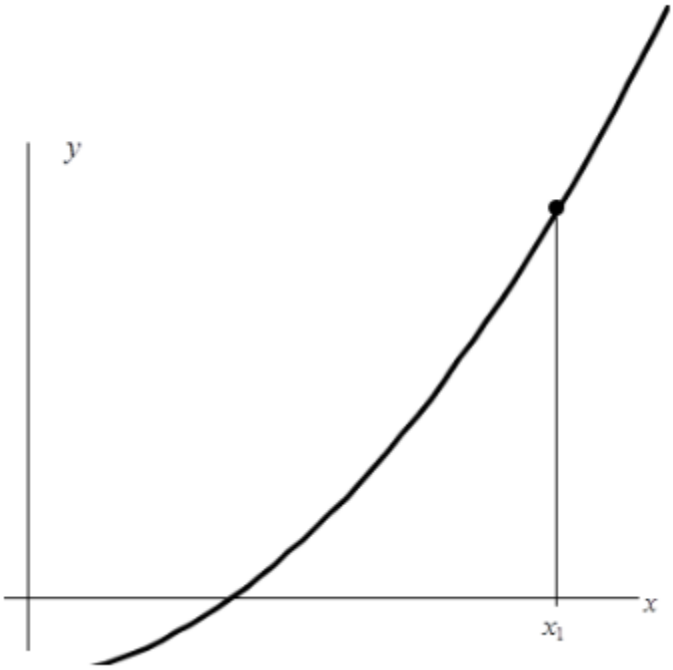
   b. $\lim_{x\to\infty}\left(\dfrac{3x^3 - 6x + 7}{2 - 5x^2 - 7x^3}\right)$

6. (10 pts) Find the equation of the oblique asymptote for $R(x) = \dfrac{3x^3 - 6x + 7}{x^2 - 5}$ This is *sort* of a limit at infinity.

7. (10 pts) Find the minimum vertical distance between $h(x) = 2x^2 - 5x + 12$ and $k(x) = 1 - 3x - x^2$.

8. (10 pts) Use the graph of the function $f(x)$, on the accompanying sheet, to show how x_2 would be found by Newton's Method, in an attempt to find a root. Derive the formula for x_2, and explain what's going on.

9. (10 pts) Suppose $f''(x) = 40x^3 - 24x^2 + 18x - 2$, and we have the initial conditions $f'(1) = f(1) = 3$. Find $f(x)$.


y
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x_1