MAT 201   Test 3 – Spring, 2015   Name_____

80 Points   Covers Chapter 3   NO GRAPHING CALCULATORS!!!

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Show all work. Do your own work. Without supporting work, the slightest misstep leads to zero credit. Spread your work out! If you get stuck, start a fresh piece of paper. You can always *insert* more pages if you do it this way. Only your *name* should be on this cover sheet.

1. (10 pts) Find all local and absolute maximum and minimum values of $f(x) = 3x^5 - 5x^3 + 2$ on $[0,2]$.

2. (10 pts) Verify that $f(x) = x^3 - 3x^2 - 45x + 47$ satisfies the hypotheses of the Mean Value Theorem on $[0,3]$. Then find all numbers c that satisfy the conclusion of the Mean Value Theorem.

3. (20 pts) Sketch the graph of $f(x) = x^3 - 3x^2 - 45x + 47$. I'm not interested in x- intercepts, or even the position, relative to the x-axis on this first pass (See Bonus.). Here's what I want to see on the graph:

    a. Local Extremes (Maximum and Minimum points on the graph). The actual y-values are worth 1 point, total, so use time wisely.

    b. Inflection points. The y-value matters less than the relative position and shape (concavity) of the curve.

4. (10 pts) Find all vertical and horizontal asymptote of $f(x) = \dfrac{x+2}{x-2}$, and use them, together with intervals of increase and decrease, and concavity (Show work!) to sketch the graph of f.

5. (10 pts) Evaluate $\lim\limits_{x \to -\infty} \left(\sqrt{25x^2 - 7x} + 5x \right)$.

6. (10 pts) Find the equation of the oblique asymptote of $g(x) = \dfrac{2x^3 - 5x^2 + 7}{x^2 - 3}$.

7. (10 pts) Suppose $f''(x) = 12x^2 + 12x - 6$, and that $f'(1) = 8$ and $f(1) = -1$. Find what $f(x)$ is.

8. **Bonus** (5 pts) Fill in the rest of the details on your graph in #3:

    a. x-intercepts.

    b. y-intercept (should already be done).

9. (5 pts) Derive Newton's method, in words and a sketch. It will suffice to show how to obtain the 2nd approximation x_2 from the 1st guess, x_1, followed by the general formula for obtaining x_{n+1} from x_n.