**GEEN 1340** **Test 3** **Fall 2007**

Show all of your work and box in your answers. A correct answer with no work will receive little or no credit. Calculators are not permitted.

1. (15 points)

a) State conditions under which a function would be guaranteed to have an absolute max and an absolute min:

b) Find any absolute max or mins for the function: $y = 27x - x^3$ on the interval [-4,2].

2. (16 points)

a) State the Mean Value Theorem.

b) Find a value of "c" that satisfies the MVT for the function $y = x^{\frac{2}{3}}$ on [0,8].

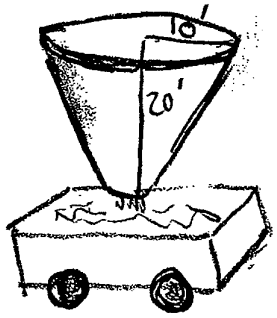
3. (30 points) Given the function and its derivatives:

$y = 2x - 3x^{\frac{2}{3}}$ $y' = \dfrac{2(x^{\frac{1}{3}} - 1)}{x^{\frac{1}{3}}}$ $y'' = \dfrac{2}{3x^{\frac{4}{3}}}$

Provide the following:

a) first derivative chart
b) extrema
c) second derivative chart
d) inflection points
e) draw an accurate sketch of the graph labeling any critical points

4. (20 points) Grain pours out of a grain storage unit through a funnel (cone) and pours into a train car. The funnel is 20 feet high and the radius is 10 feet at the base of the cone. If the grain pours out a steady rate of 30 cu ft/ min, determine how fast the height of the grain in the cone is changing when the height is 12 feet. $V = \dfrac{\pi}{3} r^2 h$




MORE FUN ON THE BACK

5. (9 points) TRUE or FALSE: If FALSE, justify your answer with a graph that provides a counter example.

a) If 6 is a critical point of the first derivative for f(x), then f(x) has a local max or min there?

b) If I wish to find inflection points for a function, the only place I can look for them are at critical points of the second derivative.

**6.** (10 points) For the following graph,

a. label along the x-axis where all first and second derivative critical points are located

b. then create both a first and a second derivative chart that match the graph.