MATH 150/GRACEY
EXAM 3/PART II/CALCULATOR PERMITTED/60 POINTS

EXAM 3

NAME_____

1. (15 POINTS) From a thin piece of cardboard 10 in. by 10 in., square corners are cut out so that the sides can be folded up to make a box. What dimensions will yield a box of maximum volume? What is the maximum volume? Round to the nearest tenth, if necessary.

2. (10 POINTS) Find the absolute extreme values of the function and the **ordered pairs** where they occur. $f(x) = 3\sqrt{x} - x$ on the closed interval $[0,9]$. Exact answers only.

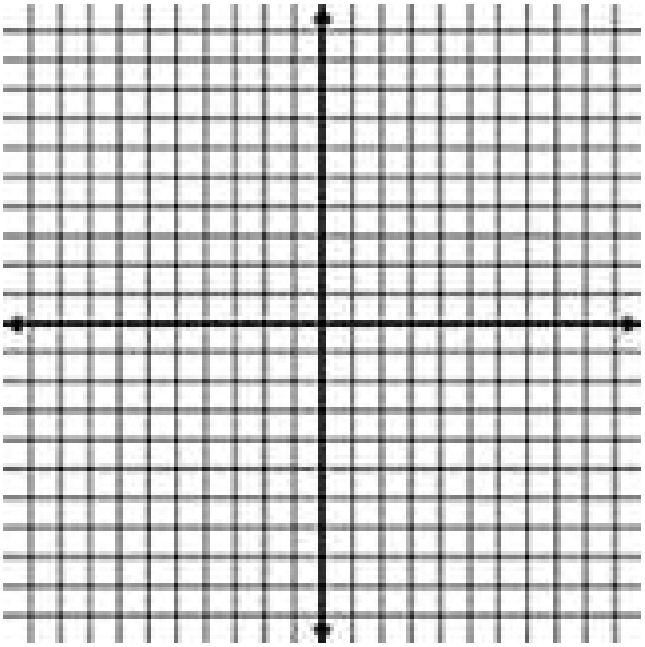
   a. Absolute minimum: _____

   b. Absolute maximum: _____

3. (5 POINTS)Use **differentials** to approximate the value of the expression $\sqrt[3]{26}$.

4. (10 POINTS) Sketch the graph of a function *f* having the following characteristics:

$f(0) = f(6) = 0$
$f'(3) = f'(5) = 0$
$f'(x) > 0 \text{ if } x < 3$
$f'(x) > 0 \text{ if } 3 < x < 5$
$f'(x) < 0 \text{ if } x > 5$
$f''(x) < 0 \text{ if } x < 3 \text{ or } x > 4$
$f''(x) > 0 \text{ if } 3 < x < 4$



5. (10 POINTS)The radius of a spherical balloon is measured as 8 inches, with a possible error of 0.02 inch. Use differentials to approximate the maximum possible error in calculating the volume of the sphere. Round to the nearest hundredth, if necessary.

6. (10 POINTS) Determine whether Rolle's Theorem can be applied to $f(x) = 2x^2 - 7, \ [0,4]$ If Rolle's Theorem can be applied, find all values of *c* on $(0,4)$ such that $f'(c) = 0$. If Rolle's Theorem cannot be applied, explain why not.