231 TEST 3

You may use your notebook during the last half hour of this exam.
You may NOT use calculators, cell phones, loose papers, or peeking.

Math 231
April 7, 2011 .   **Name:** _____

All problems on this exam are multiple choice. ***You do NOT need to show your work.*** Figure things out on the scrap page and write only your final answers here. Please circle only ONE answer for each problem.

1.   Find the x-value of the inflection point of the function $f(x) = x(x-1)(x-3)$.

$\dfrac{1}{3}$ 1 $\dfrac{4}{3}$ $\dfrac{5}{3}$ 2 3

2.   Find the x-value at which the derivative of $f(x) = \sqrt{x} - 2x$ is zero. You may assume that $x \geq 0$.

0 $\dfrac{1}{16}$ $\dfrac{1}{4}$ $\dfrac{1}{2}$ $\dfrac{1}{\sqrt{2}}$ 1

3.   Find the local maximum of the function $f(x) = \dfrac{(x-1)^2}{x+2}$.

-7 -5 -3 -1 0 1

4.   Find the global maximum of the function $f(x) = x\sqrt{x^2+1}$ on the interval $[0,4]$. Indicate which are global minima and which are global maxima.

0 1 1.5 2 3 4

5.   The graph of the implicit function $y^3 - 9y - x^2 = 0$ has a horizontal tangent line at three coordinate points (x,y). Only one of these points is in the list below; circle it.

$(0,1)$ $(1,0)$ $(0,2)$ $(2,0)$ $(0,3)$ $(3,0)$

6. What is the x-value at which the function $f(x) = x^3 - 9x^2 + 18x$ satisfies the conclusion of Rolle's Theorem on the interval $[3, 6]$?

0 $\qquad$ 3 $\qquad$ 6 $\qquad$ $3 + \sqrt{3}$ $\qquad$ $3 - \sqrt{3}$ $\qquad$ $\dfrac{14}{3}$

7. What is the value $x = c$ at which the function $f(x) = x^2 - 6x + 8$ satisfies the conclusion of the Mean Value Theorem on the interval $[0, 4]$?

-1 $\qquad$ 0 $\qquad$ 1 $\qquad$ 1.5 $\qquad$ 2 $\qquad$ 2.5

8. Suppose you are on a planet whose gravity causes a falling object to have a downward acceleration of $a(t) = -40$ feet per second per second. Given that an object has initial position 100 feet from the ground and an initial velocity of 0 feet per second, find an equation for its position $s(t)$ after t seconds.

$-10t + 100$ $\qquad$ $-20t + 100$ $\qquad$ $-40t + 100$ $\qquad$ $-10t^2 + 100$ $\qquad$ $-20t^2 + 100$ $\qquad$ $-40t^2 + 100$

9. Find the length, in feet, of the long side of the largest rectangular chicken pen that can be fenced off with total of 1200 feet of fencing material if a straight river is used for one side of the pen.

250 $\qquad$ 300 $\qquad$ 400 $\qquad$ 500 $\qquad$ 600 $\qquad$ 800

10. Suppose a cone is changing shape in such a way that its height is always two-thirds of its radius. If the radius of the cone grows at a rate of 4 inches per second, how fast, in inches per second, is the volume of the cone changing when the radius is 3 inches?

6π $\qquad$ 12π $\qquad$ 24π $\qquad$ 36π $\qquad$ 48π $\qquad$ 72π

Survey for 2 bonus points: How do you think you did? What is a question or topic that could have been on this exam, but wasn't?