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Math 229
Mock Exam 3

Disclaimer: This mock exam is for practice purposes only. It may not represent the types of questions on your instructor's exam. Use this exam to find your strengths and weaknesses and to see how long it takes to do certain problems. One of them main obstacles of any calculus exam is time management.

This exam may not be exhaustive. Ask your instructor for the exact sections being covered.

1. Keep in mind there are many different optimization problems you instructor can choose.
2. There are also many different types of functions you may be asked to sketch. Make sure you practice as many different ones as possible.
3. You may also be asked to evaluate limits as $x \to \infty$.
4. You may be asked to use Riemann Sums to evaluate a definite integral.
5. Look over the theorems. Know how to state and use them.

You can other old exams at

`http://www.math.niu.edu/courses/math229/exams/test3.s11.pdf`

`http://www.niu.edu/mlc/exam_review/math229_exam_3_andrew.pdf`

Good luck!

Calculus Tutoring Center
DU 326

EXAM 3 MATH 229, CALCULUS I, SPRING 2013 NAME:

Show all work to receive full credit.

1. State the following theorems.

   (a) The Extreme Value Theorem

   (b) Rolle's Theorem

2. Apprxoximate $\sqrt[3]{99}$, the positive zero of $f(x) = x^3 - 99$ to **3 decimals** using Newton's Method and an initial value of $x_1 = 5$.

3. Find the anti-derivative of $f(x)$ when $f''(x) = x - \cos(x)$, $f'(0) = 2$, and $f(0) = -2$.

4. Find the anti-derivative of $f(x)$

   (a) $f(x) = \frac{3}{2} + 14x^{9/5} + \sin(x)$

   (b) $f(x) = \frac{12 - x^2}{\sqrt{x}}$

   (c) $f(x) = \frac{36}{\sqrt[3]{x}}$

   (d) $f(x) = (x^{1/2} + 1)(x + 1)$

5. Find the dimensions of of a closed box with a square base with a volume of 12 that minimizes the surface area.

6. Let $f(x) = \dfrac{x^2+x+1}{x+1}$, $f'(x) = \dfrac{x(x+2)}{(x+1)^2}$, and $f''(x) = \dfrac{2}{(x+1)^3}$.

(a) Find any vertical and horizontal asymptotes of the graph f.

(b) Find the intervals of increasing and decreasing of $f(x)$.

(c) Find all local max and mins of $f(x)$.

(d) Find all intervals where $f(x)$ is concave up or concave down.

(e) Find all inflection points.

(f) Sketch $f(x)$

7. Sketch the graph of $f(x) = 3x^4 - 8x^3 + 6x^2$ by finding the following:

   (a) Intercepts
   (b) The intervals of increasing/decreasing
   (c) The local extrema
   (d) Intervals of concavity
   (e) Inflection points

   You would receive 0 credit if your graph isn't consistant with (a), (b), (c), (d).

8. Find the area under $y = \sqrt{9 - x^2}$ from $x = -2$ to $x = 2$ with 4 rectangles using right hand endpoints. You may find sketching the graph and drawing the rectangles very useful.