

NAME: _____

MATH 181 TEST 3 SAMPLE

PLEASE SHOW ALL WORK!

1.) (10 pts) Find the absolute minimum and maximum of

$$y = \frac{30x}{(x^2 + 3)^2} \text{ on } [0, 2].$$

Minimum: _____

Maximum: _____

In problem 2, determine whether Rolle's Theorem can be applied to f on the closed interval $[a, b]$. If Rolle's Theorem can be applied, find all values of c in the open interval (a, b) such that $f'(c) = 0$. If Rolle's Theorem can not be applied, explain why.

2.) (10 pts) $f(\theta) = \frac{4}{1 + \sin \theta}$ on $[0, \pi]$

Can Rolle's be applied? _____

Why or why not? _____

critical values: _____
(if possible)

3.) (10 pts) Find all values of c that satisfy the equation

$$\frac{f(b) - f(a)}{b - a} = f'(c) \text{ in the conclusion of the}$$

Mean Value Theorem if $f(x) = x^2 + 2x - 1$ on $[0, 1]$.

3. _____

4.) (20 pts) Use $y = 2 \sin x - x\sqrt{2}$ on $[-\pi, \pi]$ to find the critical #s and inflection points, interval(s) of increasing and decreasing, relative extrema (if possible), interval(s) of concavity. (DO NOT GRAPH).

Critical numbers: _____

Inflection points: _____

Increasing: _____

Decreasing: _____

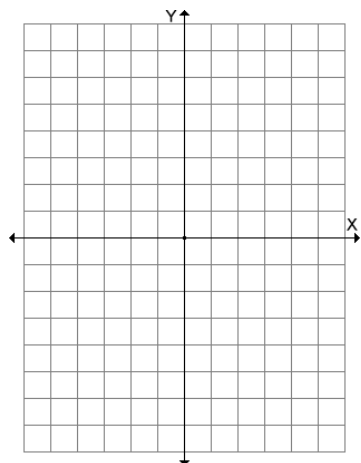
Concave up: _____

Concave down: _____

Relative Max: _____

Relative Min: _____

5.) (30 points) Find the following (if possible) and **graph**: $y = 6x^5 - 10x^3$



Critical points: _____

Inflection pts: _____

Concave up: _____

Concave down: _____

Increasing: _____

Decreasing: _____

Relative Max: _____

Relative Min: _____

x-intercept(s): _____

y-intercept: _____

6.) (10 points) Find two positive, non-zero numbers whose sum is 9 and so that the product of one number and the square of the other number is a maximum.

6. _____

7.) (10 points) A right triangle has one vertex on the line $y = 6 - \frac{6}{5}x$, another vertex at $(0, 0)$ and the last vertex on the positive x axis as shown below. What is the largest area this triangle can have? Note: the area of a triangle is $A = \frac{1}{2}xy$.

7. _____

