MTH 132 - 10/30/98 SECOND MIDTERM	Fall 98 A. Corso	Name: _____

PLEASE, BE NEAT AND SHOW ALL YOUR WORK; CIRCLE YOUR ANSWER.

Problem Number	Possible Points	Points Earned
1	20	
2	15	
3	10	
4	10	
5	15	
6	14	
7	16	
TOTAL	100	

1. Find $\frac{dy}{dx}$ using the Chain Rule if:

   (a) $y = \cos^2\left(\frac{1+x}{1-x}\right)$;

   (b) $y = (4-x^2)^3$;

   (c) $y = \cos(\cos(x^2+1))$;

   (d) $y = (x^2-7)^3(5-x)^2$.

pts: /20

2. Assuming that each equation defines a differentiable function y of x, find

(a) (10pts) $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ by implicit differentiation if $\quad x^2y + xy^2 = 2.$

(b) (5pts) $\dfrac{dy}{dx}$ by implicit differentiation if $\quad \sin(xy) = \dfrac{1}{2}.$

pts: /15

3. Two ships sail from the same island port, one going north at 24 knots (24 nautical miles per hour) and the other east at 30 knots. The northbound ship departed at 9 : 00AM and the eastbound ship left at 11 : 00AM. How fast is the distance between them increasing at 2 : 00PM? (*Hint:* Let $t = 0$ at 11 : 00AM).

pts: /10

4. Find all the critical values and the absolute maximum and absolute minimum values for

$$f(x) = 3x^4 - 16x^3 + 18x^2$$

on the closed interval $-1 \leq x \leq 4$.

pts: /10

5. Determine the intervals where the graph of the function

$$f(x) = x^6 - 3x^4 = x^4(x^2 - 3)$$

is increasing, decreasing, concave up and concave down. Then sketch the graph of $f(x)$.

pts: /15

6. (a) (4pts) State the Mean Value Theorem.

   (b) (10pts) Decide whether the Mean Value Theorem applies to the function

$$f(x) = \frac{x+1}{x-1}$$

on the interval $2 \leq x \leq 3$. If so, find all possible values of c such that

$$\frac{f(b)-f(a)}{b-a} = f'(c)$$

pts: /14

7. The graph of the derivative $f'(x)$ of a function $f(x)$ is shown

(a) On what intervals is f increasing or decreasing?

(b) At what values of x does f has a local maximum or minimum?

(c) On what intervals is f concave upward or downward?

(d) State the x-coordinates of the inflection points.

pts: /16