

**FILE COPY**

Name: \_\_\_\_\_

Circle your section number:

001	002	003	004	0L1
Shepherd	Shepherd	Mardones	Mardones	Uiyyasathian
MW 8:30-9:45	MW 1:00-2:15	TR 11:30-12:45	TR 5:30-6:45	N/A

**Instructions:**

.Put your name on this page and the next page.

.Circle your section number above.

.You are allowed a calculator, pencils, erasers and one sheet of notes.

.If you are unclear what a problem is asking, then talk to your instructor for clarification. You may not ask for hints, verification of formulas, or if you have done the problem correctly. This exam is over what YOU know to date,

.In part 1, just record your answers. In part 2 and part 3 show your work as partial credit will be given.

.Be neat. If the grader cannot understand what you have recorded, you will not get credit.

**DO NOT WRITE BELOW THIS LINE**

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Part 1: page 1. (24) \_\_\_\_\_

Page 2: (16) \_\_\_\_\_

Part 2: (5 each)

21. \_\_\_\_\_

22. \_\_\_\_\_

23. \_\_\_\_\_

24. \_\_\_\_\_

Part 3:

25. (12) \_\_\_\_\_

26. (12) \_\_\_\_\_

27. (6) \_\_\_\_\_

28. (10) \_\_\_\_\_

**TOTAL: (100) \_\_\_\_\_**

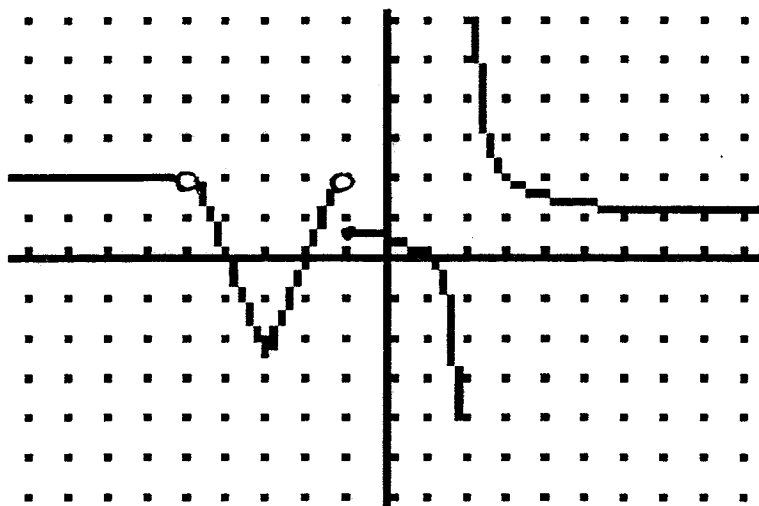
MATH 1080 FALL 2003 UNIFORM FINAL

Name: \_\_\_\_\_

Test Score: \_\_\_\_\_

**PART 1:** Each question is worth 2 points. Just record your final answer. Answers will be right or wrong.

In problems 1-7 answer the following questions using the graph of  $f(x)$  given at the right. Each tic mark represents one unit. Use  $+\infty$  or  $-\infty$  or DNE (does not exist) where appropriate.



1.  $\lim_{x \rightarrow -5^-} f(x) =$  \_\_\_\_\_ 2.  $\lim_{x \rightarrow -5^+} f(x) =$  \_\_\_\_\_ 3.  $\lim_{x \rightarrow -1} f(x) =$  \_\_\_\_\_

4.  $\lim_{x \rightarrow 2^-} f(x) =$  \_\_\_\_\_ 5.  $\lim_{x \rightarrow +\infty} f(x) =$  \_\_\_\_\_

6. For what values of  $x$  is  $f(x)$  NOT continuous? \_\_\_\_\_

7. For what values of  $x$  is  $f(x)$  NOT differentiable? \_\_\_\_\_

8.  $\lim_{x \rightarrow 2} \left( \frac{x+2}{x^2-4} \right) =$  \_\_\_\_\_

9. If  $e^{6x} = 50$  then  $x =$  \_\_\_\_\_ exact answer or round to 2 decimal places.

In problems 9-12: Evaluate the derivatives. You do not have to simplify.

10. If  $f(x) = 2x^3 - 5x^2 + 2$ , then  $f'(2) =$  \_\_\_\_\_

11. If  $f(x) = \ln(5x)$  then  $f'(x) =$  \_\_\_\_\_

12. If  $y = 3x^5 - 4x^3 + 7x^2 - 6x$  then  $y'' =$  \_\_\_\_\_

In problems 13-15: Evaluate the integrals. You do not have to simplify.

13.  $\int (3x^2 - 5) dx =$  \_\_\_\_\_ 14.  $\int \sqrt[3]{x} dx =$  \_\_\_\_\_

15.  $\int_2^5 (x^{-1} + x) dx =$  \_\_\_\_\_ exact answer or round to 2 decimal places.

16. If  $h(x) = \frac{3x^2}{x^2 + 2x - 3}$ , then the vertical asymptote(s) of  $h(x)$  are:

\_\_\_\_\_ (your answer(s) should be equations of lines)

Answer the following questions assuming  $h(x)$  is a function defined for all  $x$ ,  $h'(x) > 0$  on  $(-\infty, 1)$  and  $(3, \infty)$ ,  $h'(x) < 0$  on  $(1, 3)$ ,  $h''(x) < 0$  on  $(-\infty, 2)$ , and  $h''(x) > 0$  on  $(2, \infty)$ .

17. List all the intervals on which  $h(x)$  is decreasing: \_\_\_\_\_

18. A local minimum of  $h(x)$  occurs when  $x =$  \_\_\_\_\_

19. List all the intervals on which  $h(x)$  is concave down. \_\_\_\_\_

20. List the  $x$ -coordinate of all inflection points of  $h(x)$ : \_\_\_\_\_

Part 2: Each problem is worth 5 points. Show all your work and simplify.

21. Find the indicated derivative.  $f'(x)$  for  $f(x) = \frac{x^2 - 5}{2x - 1}$

22. Find the indicated derivative.  $\frac{d}{dx}((3x-1)^3 e^x)$

23. Find the indefinite integral and CHECK the result by differentiating.

$$\int \frac{t^2}{(t^3-2)^5} dt$$

24. Find the definite integral.  $\int_1^2 (5x^4 - \frac{1}{x} + e^x) dx$  (round your answer to 2 decimal places)

**PART 3: You must show all your work. Partial credit will be given.**

**25. (12 points) Let  $f(x) = x^3 - 3x^2 - 9x + 10$ . Find the following:**

**a) All extrema and increasing and decreasing intervals. (show your sign chart)**

The local maximum is \_\_\_\_\_

when  $x =$  \_\_\_\_\_.

The local minimum is \_\_\_\_\_

when  $x =$  \_\_\_\_\_.

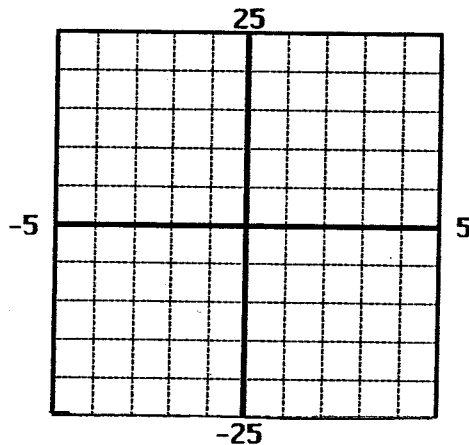
Increasing interval(s) \_\_\_\_\_ Decreasing interval(s) \_\_\_\_\_

**c) Point(s) of inflection:**

**d) Intervals where  $f(x)$  is concave up and concave down.**

concave up: \_\_\_\_\_ concave down: \_\_\_\_\_

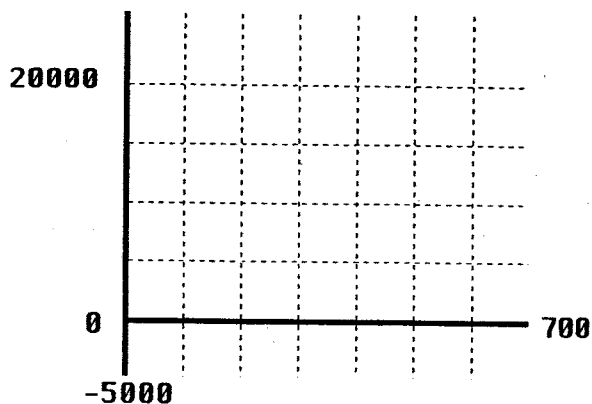
**e) Graph the function.**



26.(12 points) Let  $p(x) = 100 - 0.15x$  and  $C(x) = 28x + 3200$  be the price-demand equation and the cost function, for the manufacture of ski jackets.

a) The revenue function  $R(x) =$  \_\_\_\_\_

b) Graph the revenue function and the cost function on the interval  $[0, 700]$  and find the break-even points.



The break-even points are:  
Round to the nearest integer.

( \_\_\_\_\_ , \_\_\_\_\_ )

( \_\_\_\_\_ , \_\_\_\_\_ )

c) The profit function  $P(x) =$  \_\_\_\_\_

d) Use calculus to find the maximum profit.

The maximum profit is \_\_\_\_\_

when \_\_\_\_\_ ski jackets are produced.

e) Find the price (rounded to the nearest cent) that should be charged per item to obtain the maximum profit.

f) Find the average cost per unit if 200 ski jackets are produced.

27. (6 points) The market research department for an automobile company estimates that the sales (in millions) of a new automobile will increase at the monthly rate of

$$S'(t) = 5e^{-0.1t} \quad t \text{ months after the introduction of the automobile.}$$

a) What will be the total sales  $S(t)$ , after  $t$  months if we assume that  $S(0) = 0$ ?

$S(t) =$  \_\_\_\_\_

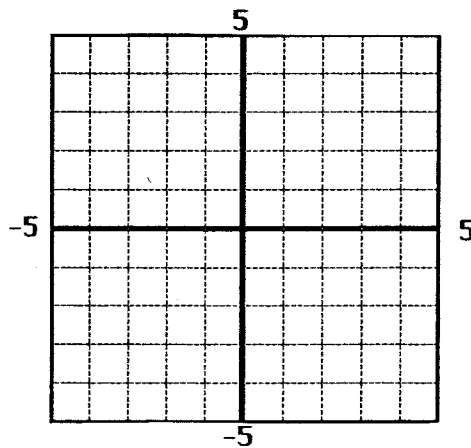
b) What are the estimated total sales during the first 6 months after the introduction of the automobile?

The total sales during the first 6 months is \_\_\_\_\_ million.

28. ( 10 points) Let  $f(x)=x^2+x+1$  and  $g(x)=x-1$

a) Find the equation of the tangent line to the graph of  $f(x)$  at  $x = 1$ .

b) Graph  $f(x)$  and  $g(x)$



c) Find the area bounded by the graphs over the interval  $[-2, 1]$ .

d) Shade the area you found in part (c) on the graph in part (b).