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MATH 1080 Spring 2003 UNIFORM FINAL

Name: ____

Circle your section number:

001	002	003	005	006	OL1
Sullivan	Shepherd	Shepherd	Mardones	Douthitt	Uiyyasathian
MW 8:30-9:45	MW 11:30-12:45	MW 2:30-3:45	TR 1:00-2:15	TR 4:00-5:15	N/A

Instructions:

. Put your name on this page and on 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, 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

Part 1: Page 1. (22)______________ Page 2: (28)______________

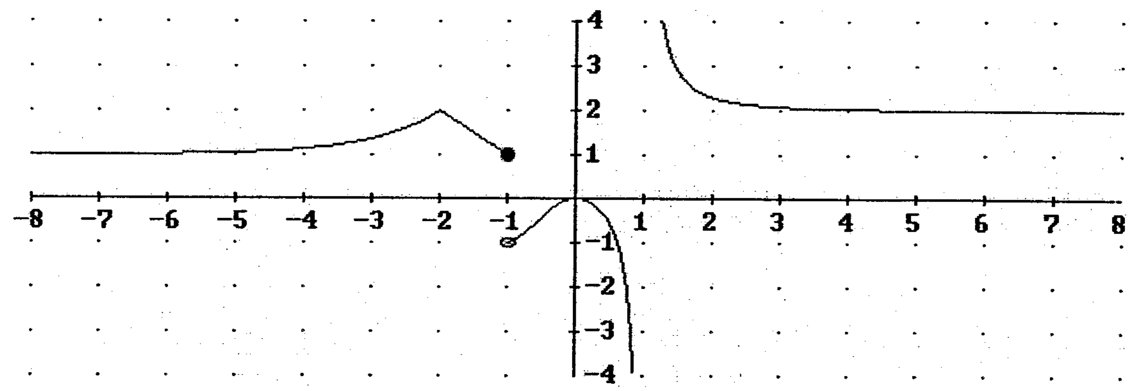
Part 2: (10 each)

1) ____________ 2) ____________ 3) ____________

4) ____________ 5) ____________ Total: (100)____________

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

Limits and graphs:



Answer the following using the graph of f(x) is given above:

1. Lim $_{x\text{->}-1-}$ f(x) = ___________
2. Lim $_{x\text{->}-1+}$ f(x) = ___________
3. Lim $_{x\text{->}-1}$ f(x) = ___________
4. Lim $_{x\text{->}1+}$ f(x) = ___________
5. Lim $_{x\text{->}oo}$ f(x) = ___________
6. List all the points for which f(x) is NOT continuous: x = ________________
7. The relative maxima of f(x) are y = _________________________________

Application of derivative.

Answer the following questions assuming g(x) is a function defined for all x, g'(x) < 0 for x on (-oo, 3) and (7,00), g'(x) > 0 for x on (3,7) and g'(3) = g'(7) = 0. You are also given that g"(5)=0.
If there is not enough information to answer the question, write "Can't tell".

8. List all the intervals on which g(x) is increasing: _____________________
9. A local minimum of g(x) occurs when x = __________________________
10. List all the intervals on which g(x) is concave up: ___________________
11. List the x-coordinate of all inflection points of g(x): ___________________

Answer the following questions:

12. If $f''(x) = x^2 - 4x + 3$, then the x-coordinate of the inflection points of f(x) is: ____________________

13. If $f''(x) = x^2 - 4x + 3$, then the graph of y = f(x) is concave down on the interval(s) ____________________

14. If $g(x) = 2(x^2 - 1)/(x^2 - 4)$, then the vertical asymptote(s) of g(x) are: ____________________ (your answer(s) should be equations of lines)

15. If $g(x) = 2(x^2 - 1)/(x^2 - 4)$, then the horizontal asymptote(s) of g(x) are: ____________________ (your answer(s) should be equations of lines)

Evaluate the following (you do not have to algebraically simplify your answers):

16. If $y = \ln(3x)$, then dy/dx = ____________________

17. If $y = x^2 e^x$, then dy/dx = ____________________

18. If $y = (4 + x^2)^9$, then dy/dx = ____________________

19. If $y = 3x/(1+e^x)$, then dy/dx = ____________________

20. If $y = 5x^4 - 3x^3 + 11x^2 + 9$, then d^2y/dx^2 = ____________________

21. integral $(3x^2 + 9x + 5)dx$ = ____________________

22. int $(3x^2 (1 + x^3)^9 dx$ = ____________________

23. int _from 1 to 3 $(2 + e^x)dx$ = ____________________

Answer the following as True of False

24. If a function is continuous at x = a, then it is differentiable at x = a. ____________________

25. A critical number of a function always corresponds to a relative maximum or a relative minimum. ____________________

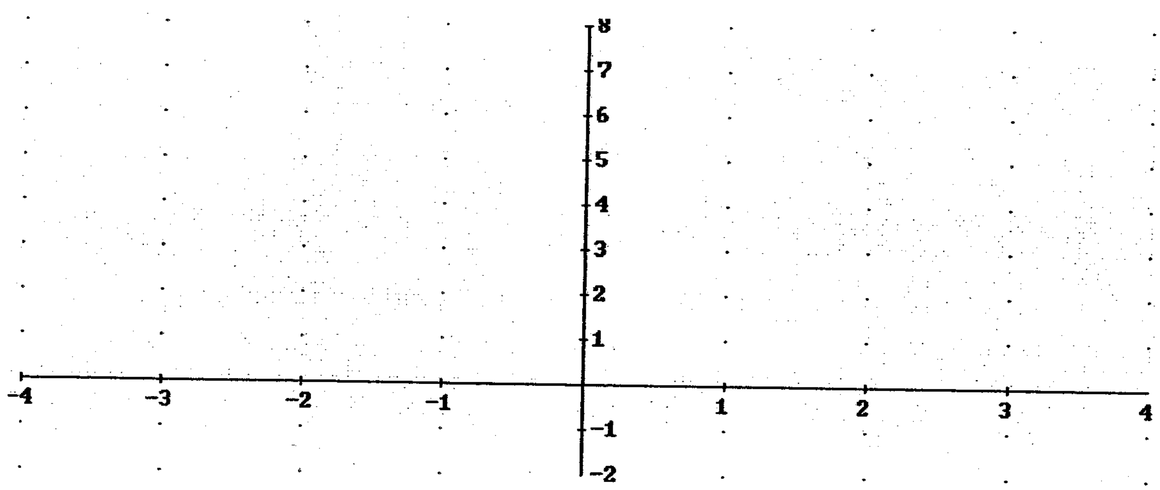
Part 2: Each problem is worth 10 points. You must show all your work. Partial credit will be given.

1. Let $f(x) = -x^2 + 2x + 3$

   a) Find the equation of the tangent line to the graph of f(x) at x = 2.

   b) Find the area bounded by f(x) and the x-axis.

   c) Graph f(x) and the tangent line found in part a. Also shade the area for part b.



2) Let $y = x^3 + 2x^2 + x$. Find the following:

a) All extrema (state whether they are a maximum or a minimum)

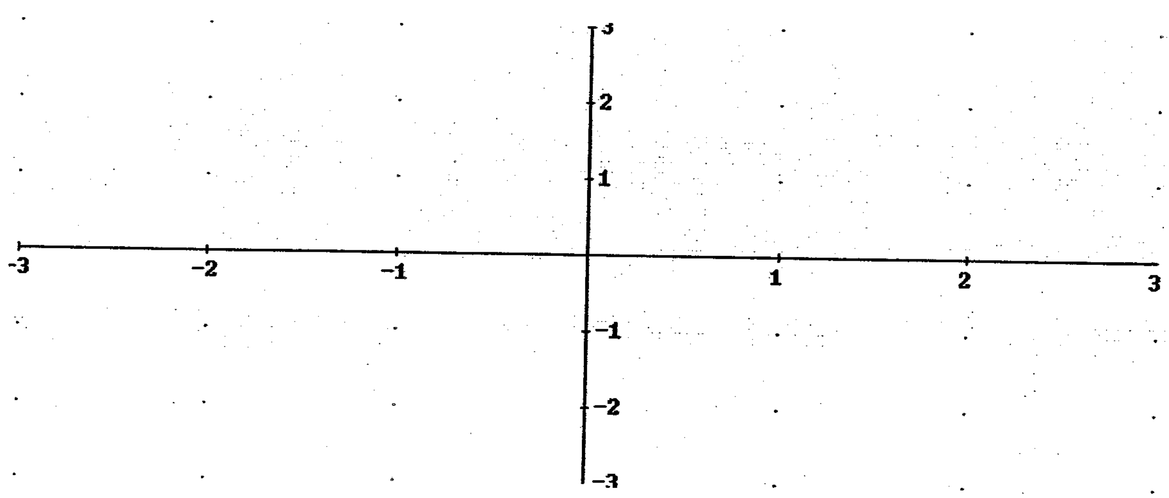
b) Points of inflection:

c) Intervals where y is increasing:

d) Intervals where y is concave down.

e) All intercepts

c) Graph the function, label all points clearly.

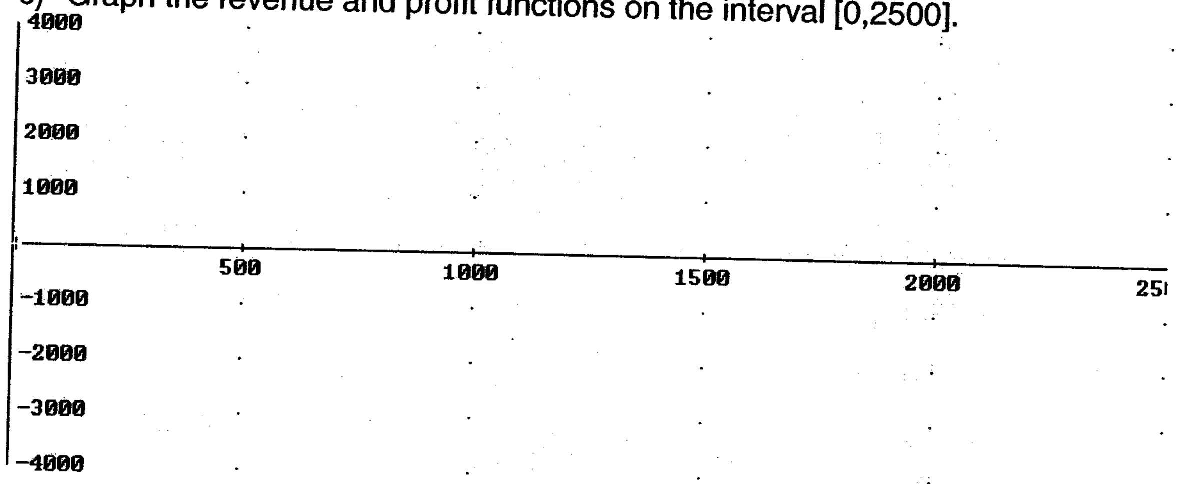


2. In manufacturing and selling x units of a certain commodity, the price-demand function is given by: $p(x) = 5.00 + 0.002x$ where p is in dollars. There is a fixed cost of $3.00 and a variable cost of $1.10 per unit.

a) Find the revenue, R(x), as a function of x.

b) Find the profit, P(x), as a function of x.

c) Graph the revenue and profit functions on the interval [0,2500].



d) Use calculus to find the maximum profit (exact value)

e) Find the exact price that should be charged per item to obtain the maximum profit.

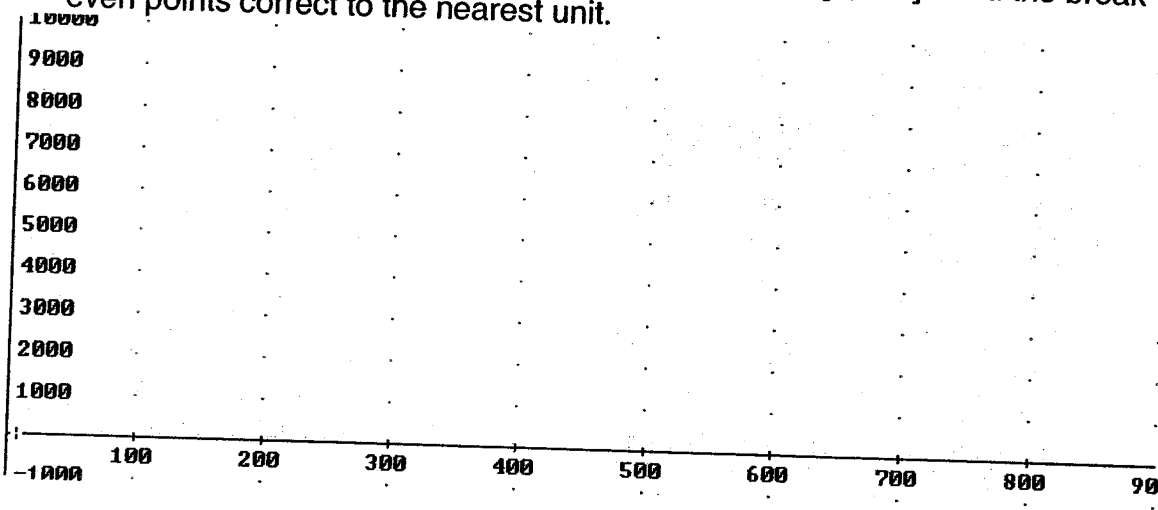
3. The price-demand equation and the cost function for the production of hand-woven silk scarves are given, respectively, by

$$p = 60 - 2\sqrt{x} \qquad \text{and} \qquad C(x) = 3000 + 5x$$

where x is the number of scarves that can be sold at a price of $p per unit and C(x) is the total cost (in dollars) of producing x scarves.

a) Express the revenue function in terms of x:

b) Graph the cost and revenue functions on the interval [0,900]. Find the break-even points correct to the nearest unit.



Break-even points: __________

c) Find the marginal revenue at the smaller break-even point.

d) Find the average cost per unit if 400 scarves are produced.

5) The marginal profit for the sale of x telephones is

$$P'(x) = 3 - 0.08x$$

Find the profit function if $P(0) = -500$.