MATH 1080 FALL 2002 UNIFORM FINAL

Name: _____

Circle your section number:

001	002	003	004	OL1
Jenkens, C	Russell, S.	Mardones, H.	Rasmussean, C.	Byrne, R
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 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. (18)_____ Page 2: (32)_____

Part 2: (10 each)

1) _____ 2) _____ 3) _____

4) _____ 5) _____ Total: (100)_____

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Name: _____ **Grade:**_____

PART 1: *Record your answer. You do not have to show your work. Answers are right or wrong – no partial credit given. Each problem is worth 2 points*

In problems 1 – 9: Evaluate the limits. Use $+\infty$ or $-\infty$ where appropriate.

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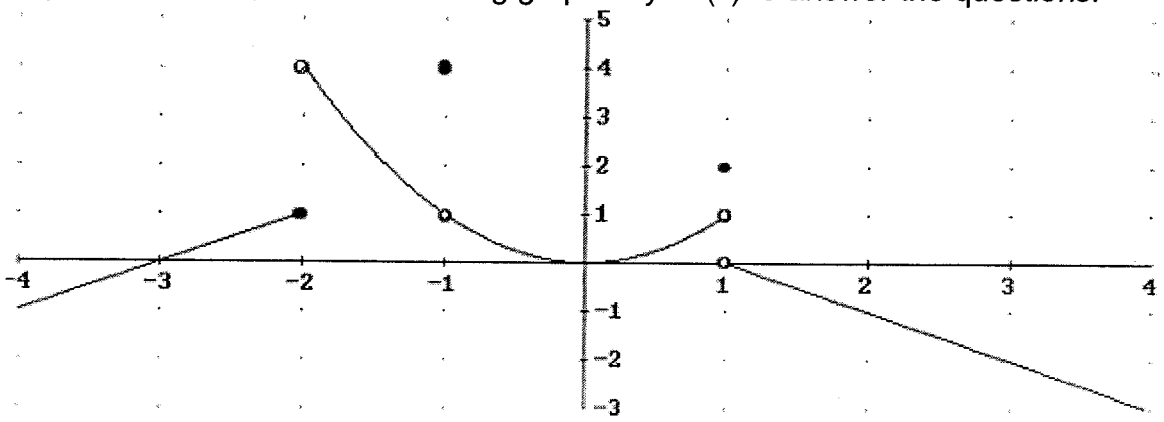
In problems 1 - 6, use the following graph of y = f(x) to answer the questions:



1. $\lim_{x->-1^-} f(x) =$ _____
2. $\lim_{x->-1^+} f(x) =$ _____
3. $\lim_{x->-1} f(x) =$ _____
4. $\lim_{x->1^-} f(x) =$ _____
5. $\lim_{x->1^+} f(x) =$ _____
6. $\lim_{x->1} f(x) =$ _____

.....

7. $\lim_{x->1} \frac{x^2+3x-4}{x-1} =$ _____
8. $\lim_{x->1} \frac{x^2+3x-4}{x+1} =$ _____
9. $\lim_{x->1^-} \frac{x^2-1}{|x-1|} =$ _____

In problems 10 -18: evaluate the derivatives. YOU DO NOT HAVE TO SIMPLIFY YOUR ANSWERS:

10. If $f(x) = 4x^2 - 9x + 3$, then $f'(2) =$ _____

11. If $f(x) = x \ln x$, then $f'(x) =$ _____.

12. If $f(x) = \frac{e^x}{x}$, then $f'(x) =$ _____

13. If $f(x) = \ln(2x)$, then $f'(x) =$ _____

14. If $f(x) = \sqrt{x^2 - 3}$, then $f'(x) =$ _____

15-16. The critical value of $f(x) = x^3 - 6x^2 + 9x - 8$ are $x =$ _____ and $x =$ _____

17-18. If $f(x) = x^3 - 6x^2 + 9x - 8$, then $f''(x) =$ _____

and an inflection of f(x) occurs at $x =$ _____

In problems 19 - 23: Evaluate the integrals.

19. $\int_1^3 2x - 1 \, dx =$ _____

20. $\int e^{3x} dx =$ _____

21. $\int (x-1)^2 dx =$ _____

22. $\int \frac{x+1}{x} dx =$ _____

23. $\int_1^4 \sqrt{x} \, dx =$ _____

24. The derivative of f(x) is positive on $(-\infty, 2)$ and on $(7, \infty)$, negative on $(2, 7)$, and zero at $x = 2$ and 7. Then, f(x) has a local maximum at

$x =$ _____

25. The second derivative of f(x) is positive on $(-\infty, 2)$ and on $(7, \infty)$, negative on $(2, 7)$, and zero at $x = 2, 7$. The first derivative of f(x) is zero at $x = -1, 5$ and 7. Then f(x) has a local maximum at

$x =$ _____

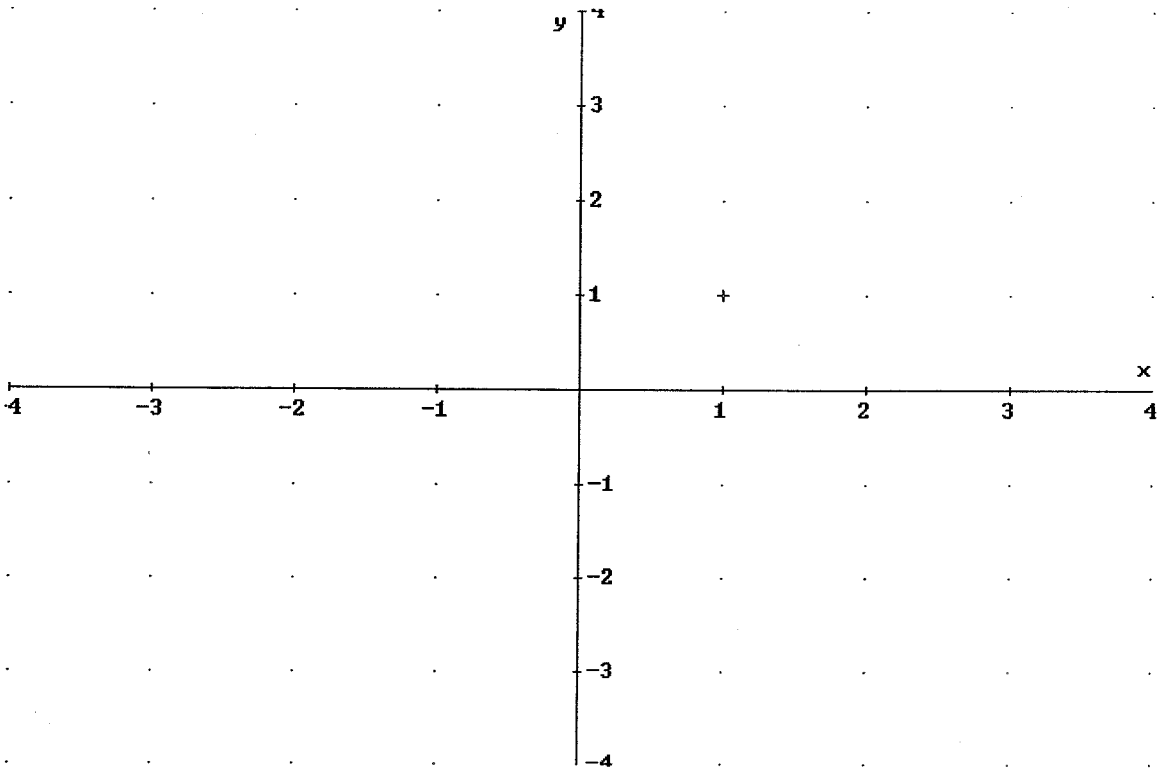
Part II: *Applications. Show all your work as partial credit will be awarded. Each problem is worth 10 points.*

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

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

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

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



2) A company sells x jackets per month. The monthly cost function is

$$C(x) = 64000 + 50x,\ 0 \leq x \leq 5000$$

The price-demand equation is

$$p = 300 - \frac{x}{30}$$

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

b) Find the profit function, P(x)

c) Find the maximum revenue and the number of jackets produced to maximize it.

d) Find the maximum profit and the number of jackets produced to maximize it.

3) Let $f(x) = e^{-x^2}$

a) Find all the critical points of f(x)

b) Find all extrema of f(x) and where they occur.

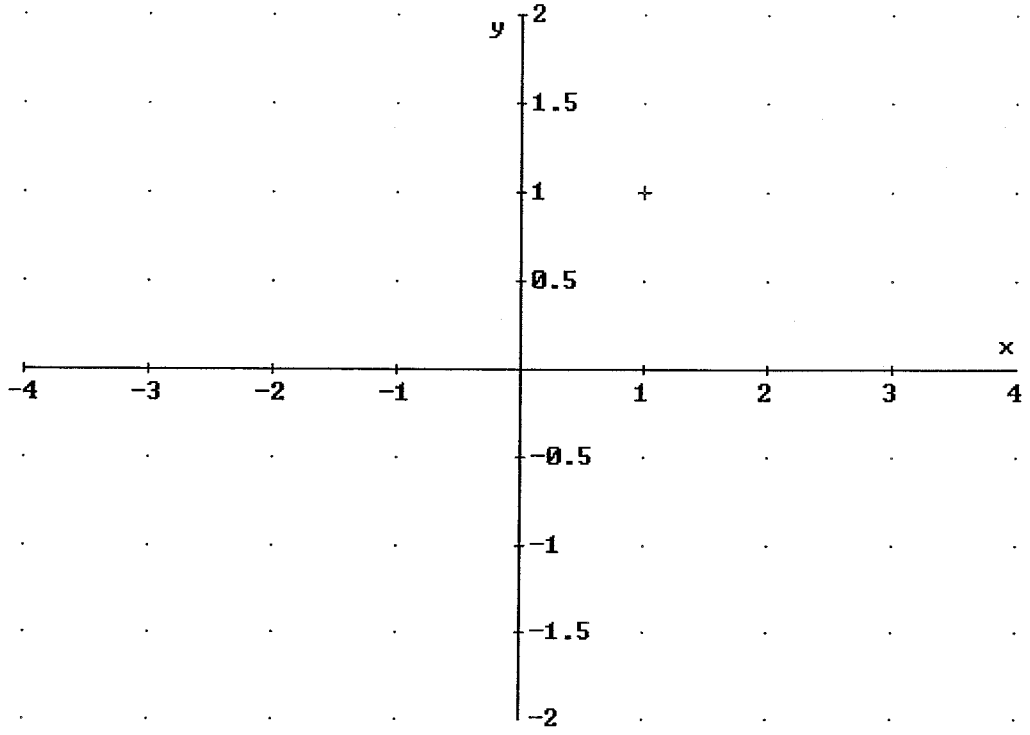
c) Find the inflection points of f(x)

d) Find all asymptotes of f(x)

e) Where is f(x) increasing?

f) Where is f(x) concave up?

g) Graph f(x)



4) The velocity of a car was traveling from Denver to Pueblo was recorded in the following table.

Time: hours	0	.25	.50	.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
Velocity: mph	0	30	50	60	65	75	75	75	70	65	70

a) Using the table, find the average acceleration from $t = 0.25$ to $t = 0.75$. Include units in your answer.

b) Using the table, estimate the acceleration at $t = 0.75$

c) Using the table, estimate the distance traveled in the 2.5 hours.

5) The rate of change of the monthly sales of a new model television set is given by

$$S'(t) = \frac{300}{\sqrt{3t+1}}, 0 \le t \le 24$$

where t is the number of months since the new set was released and S(t) is the number of sets sold each month, so S(0) = 0 to start.

a) Find S(t)

b) Find the total sales at the end of the first year.

c) Find the number of months it will take the sales to reach 600 sets.