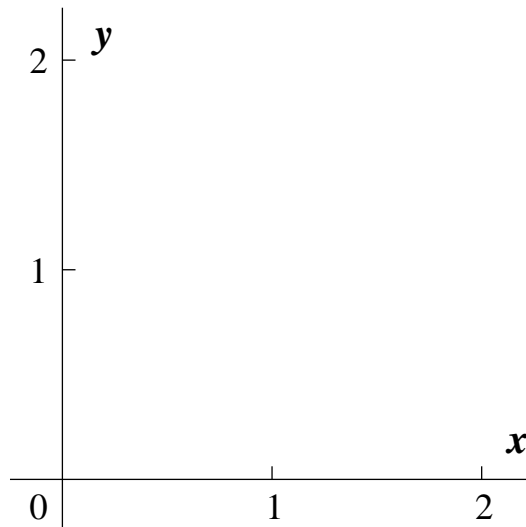


(10) 1. Suppose $f(x) = \frac{1}{x+2}$. Use the **definition of derivative** to find $f'(x)$.

(12) 2. a) Find the equation of a line tangent to $y = \frac{4x}{2+x^2}$ when $x = 1$.

b) Sketch the graph of $y = \frac{4x}{2+x^2}$ and the tangent line found in a) on the axes below.

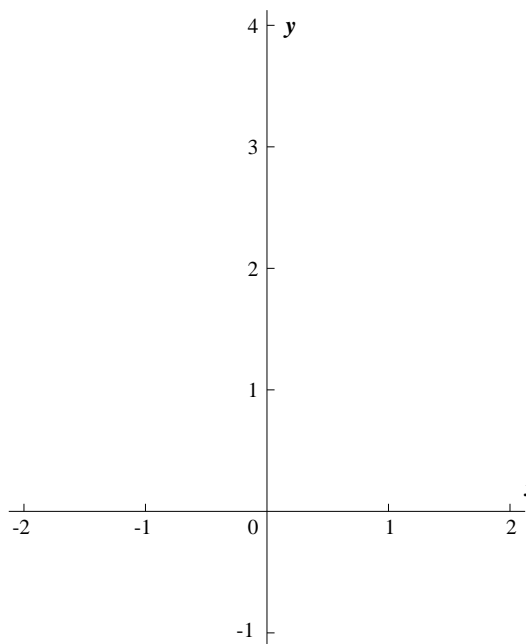


(14) 3. Suppose that the function $f(x)$ is described

$$\text{by } f(x) = \begin{cases} 3 - x^2 & \text{if } x < 0 \\ Ax + B & \text{if } 0 \leq x \leq 1 \\ 2^x & \text{if } 1 < x \end{cases}$$

a) Find A and B so that $f(x)$ is continuous for all numbers. Briefly explain your answer.

b) Sketch $y = f(x)$ on the axes given for the values of A and B found in a) when x is in the interval $[-2, 2]$.



(20) 4. Evaluate the indicated limits exactly. Give evidence to support your answers.

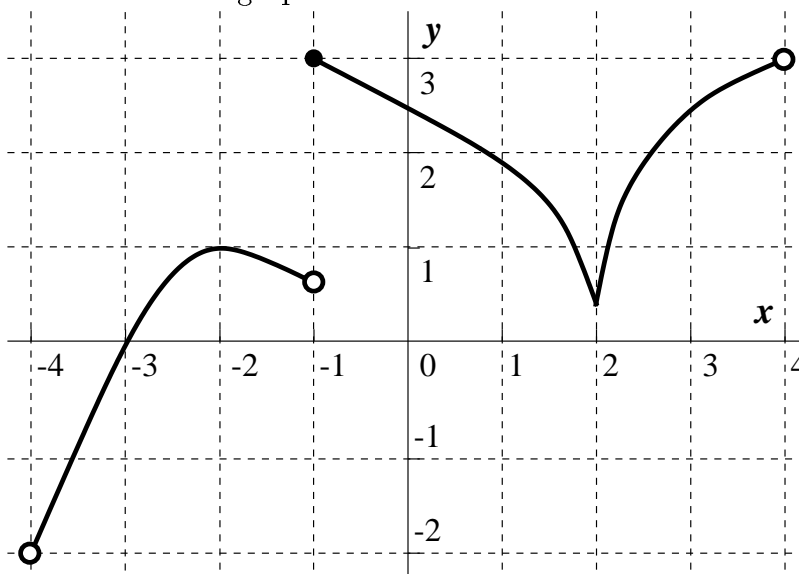
a) $\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x - 1}$

b) $\lim_{x \rightarrow 2^+} \frac{|x - 1| - 1}{|x - 2|}$

c) $\lim_{x \rightarrow 3} \frac{\sqrt{x} - \sqrt{3}}{x - 3}$

d) $\lim_{x \rightarrow 4} \frac{3x - 2}{\cos(\pi x)}$

- (8) 5. Suppose that $f(x) = x^5 + 3 \cos(Kx^2)$ where K is an unknown constant.
- Briefly explain why $f(2)$ must be positive.
 - Briefly explain why $f(-2)$ must be negative.
 - Briefly explain why the equation $f(x) = 0$ must have a solution, and specify an interval on the x -axis in which a solution can be found.
- (8) 6. What is the domain of $f(x) = \frac{\ln x + \sqrt{4-x}}{\sin x}$? Explain your answer algebraically.
- (18) 7. In this problem the function $f(x)$ has domain all x 's between -4 and 4 : $-4 < x < 4$. A graph of $y = f(x)$ is displayed below. Answer the following questions as well as you can based on the information in the graph.



- What is the range (the collection of values) of $f(x)$? **ANSWER:** _____
 - For which x is $f(x)$ *not* continuous? **ANSWER:** _____
 - For which x is $f(x) = 0$? **ANSWER:** _____
 - For which x is $f(x) > 0$? **ANSWER:** _____
 - For which x is $f(x)$ *not* differentiable? **ANSWER:** _____
 - For which x is $f'(x) = 0$? **ANSWER:** _____
 - For which x is $f'(x) > 0$? **ANSWER:** _____
- (10) 8. a) If $f(x) = \frac{1 - e^x}{x^2 + 1}$, what is $f'(x)$?
- b) If $f(x) = (2x + 3 \cos x)(x^4 - x^2)$, what is $f'(x)$?
- c) Suppose that $g(x)$ is a differentiable function and that $g(1) = 2$, $g'(1) = -3$, and $g''(1) = 4$. What is the value of the second derivative of $f(x) = x^3g(x)$ when $x = 1$?

A**A****First Exam for Math 135, sections 21, 22, and 23**

February 22, 2005

NAME _____

SECTION (please circle one) 21 22 23

Do all problems, in any order.**Show your work. An answer alone may not receive full credit.****No notes other than the distributed formula sheet may be used on this exam.**

Problem Number	Possible Points	Points Earned:
1	10	
2	12	
3	14	
4	20	
5	8	
6	8	
7	18	
8	10	
Total Points Earned:		

A**A**