(8) 1. The derivative of $f(x) = \dfrac{4}{5 - x^2}$ is $f'(x) = \dfrac{8x}{(x^2 - 5)^2}$. Use this information to write an equation for the line tangent to $y = \dfrac{4}{5 - x^2}$ when $x = 2$.

(9) 2. Compute these limits. Give some brief supporting evidence for your answers.

a) $\displaystyle\lim_{x \to 2} \dfrac{x^2 - 2x}{x + 1}$

b) $\displaystyle\lim_{x \to 2} \dfrac{x^2 - 2x}{x - 2}$

c) $\displaystyle\lim_{x \to 0} \dfrac{\sin(2x)}{3x}$

(10) 3. Suppose $f(x) = \sqrt{3x + 1}$. Use algebraic properties of limits to compute $\displaystyle\lim_{h \to 0} \dfrac{f(x + h) - f(x)}{h}$.

(12) 4. Here is a graph of $y = f(x)$ which should be used to answer the questions following as well as possible.
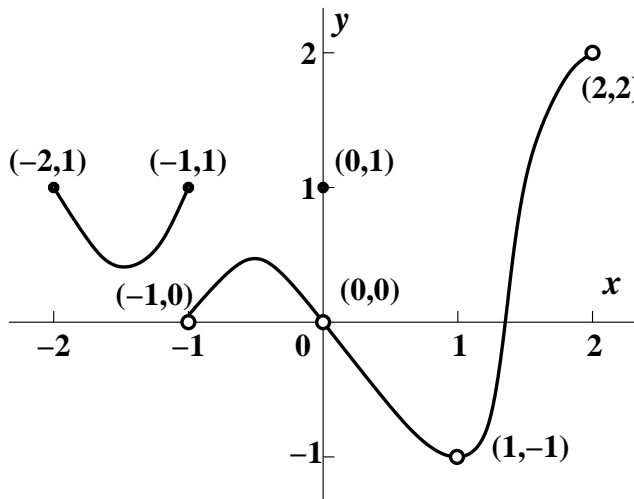

The entire graph of $y = f(x)$

a) What, exactly, is the domain of $f(x)$? **ANSWER:** _____

What, exactly, is the range of $f(x)$? **ANSWER:** _____

b) Answers to the following questions should either be a specific real number which is the limit value, or **DNE** if the requested limit does not exist.

What is $\displaystyle\lim_{x \to -1^-} f(x)$? **ANSWER:** _____

What is $\displaystyle\lim_{x \to -1^+} f(x)$? **ANSWER:** _____

What is $\displaystyle\lim_{x \to -1} f(x)$? **ANSWER:** _____

What is $\displaystyle\lim_{x \to 0^-} f(x)$? **ANSWER:** _____

What is $\displaystyle\lim_{x \to 0^+} f(x)$? **ANSWER:** _____

What is $\displaystyle\lim_{x \to 0} f(x)$? **ANSWER:** _____

(10) 5. Suppose $f(x) = \begin{cases} x^2 & \text{if } x < 1 \\ Ax + B & \text{if } 1 \le x \le 2 \\ 5 - x & \text{if } 2 < x \end{cases}$.

a) Find A and B so that $\lim_{x \to 1} f(x)$ and $\lim_{x \to 2} f(x)$ both exist.

b) Use the values of A and B found in a) to sketch the graph of $y = f(x)$ on the axes given.
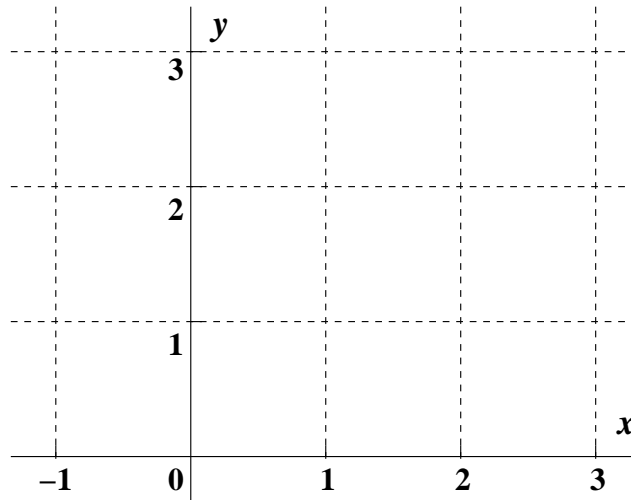
(6) 6. What is the natural domain of $f(x) = \sqrt{8 - x} + \dfrac{5}{\sqrt{x + 4}}$?

Semi Exam for Math 135, section F2

July 3, 2006

NAME ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Do all problems, in any order.

Show your work. An answer alone may not receive full credit.

No notes may be used on this exam.

No calculators may be used on this exam.

Problem Number	Possible Points	Points Earned:
1	8	
2	9	
3	10	
4	12	
5	10	
6	6	
Total Points Earned:		