

Name:

Show all work to receive full credit.

1. Sketch a graph of  $f(x)$  that satisfies the following conditions:

$$\lim_{x \rightarrow 4} f(x) = 3$$

 $f$  is NOT continuous at  $x = 4$ 

$$\lim_{x \rightarrow 2} f(x) = -1$$

 $f$  is continuous at  $x = 2$ 

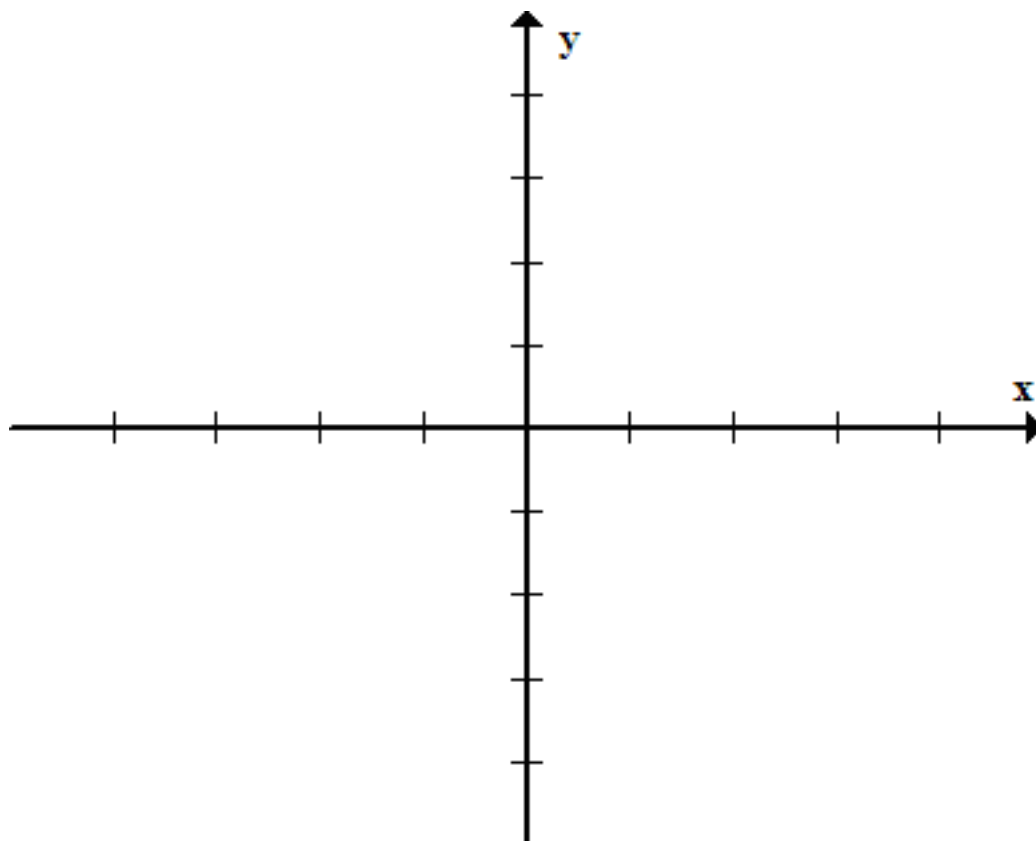
$$\lim_{x \rightarrow -1^-} f(x) = 1$$

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

$$f(-1) = 1$$

$$\lim_{x \rightarrow -3^-} f(x) = -\infty$$

$$\lim_{x \rightarrow -3^+} f(x) = \infty$$



2. Let  $f(x) = \begin{cases} 2 - x^2, & x < 1 \\ \sqrt{x}, & 1 \leq x \leq 5 \\ x, & x > 5 \end{cases}$

(a) Find  $\lim_{x \rightarrow 1} f(x)$ ,  $\lim_{x \rightarrow 5^-} f(x)$ ,  $\lim_{x \rightarrow 5^+} f(x)$ , and  $\lim_{x \rightarrow 5} f(x)$

(b) Is  $f$  continuous at  $x = 1$ ? Explain your answer using limit notation.

(c) Is  $f$  continuous at  $x = 5$ ? Explain your answer using limit notation.

3. Find the limits, if they exist.

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

$$(b) \lim_{x \rightarrow 2} \frac{\sqrt{5x-1}}{4x-3}$$

$$(c) \text{ Let } f(x) = \begin{cases} \frac{\sqrt{x}-4}{x-16}, & x \neq 16 \\ \frac{1}{4}, & x = 16 \end{cases}$$

Find  $\lim_{x \rightarrow 16} f(x)$  and determine if  $f(x)$  is continuous at  $x = 16$ . Show all work and you must use limit notation.

4. Let  $f(x) = 2x^2 - x - 5$ .

(a) Find a formula for  $f'(x)$  by using the limit definition of a derivative.

(b) Find the equation of the tangent line to  $f(x) = 2x^2 - x - 5$  at  $x = 1$

**Warning: This list is not exhaustive.** These may not represent the problems on the exam. They do, however, focus on concepts that I do feel represent the problems on the exam.

5. Word Problems. Focus on Section 1.3 #s 29, 33, 34, 40-43
6. Additional Problems: 1.4 #s 29-34
7. Anything I've said or done in lecture.