

PRE-CLASS ACTIVITY

Math 1110 - Instructor: Itamar Oliveira

NAME: _____
due next class

1. Read the definition of continuous function in the book and explain why or why not each one of the following functions is or is not continuous:

(a)

$$f(x) = x + 1.$$

(b)

$$g(x) = \begin{cases} \frac{x^2-1}{x-1} & \text{if } x \neq 1 \\ 1 & \text{if } x = 1 \end{cases}$$

(c)

$$h(x) = \begin{cases} \frac{x}{|x|} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$$

(d)

$$k(x) = \begin{cases} \frac{1}{x^2} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$$

(e)

$$\ell(x) = \frac{1}{x}.$$

(f)

$$m(x) = \begin{cases} \sin(1/x) & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$$

2. Consider the function

$$f(x) = \begin{cases} x^2 & \text{if } x \text{ is rational} \\ 0 & \text{if } x \text{ is not rational} \end{cases}$$

Then

- (a) There is no a for which $\lim_{x \rightarrow a} f(x)$ exists.
- (b) There may be some a for which $\lim_{x \rightarrow a} f(x)$ exists, but it is impossible to say without more information.
- (c) $\lim_{x \rightarrow a} f(x)$ exists only when $a = 0$.
- (d) $\lim_{x \rightarrow a} f(x)$ exists for infinitely many a .
- (e) f is continuous at 0.