## Math 4050

## Practice Problem Set #9

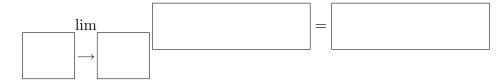
Problem 9.1 Calculate

$$\lim_{x \to 0} \frac{\tan 2x}{5x}$$

**Problem 9.2** Find a number  $\delta$  so that

$$0 < |x - 6| < \delta \Longrightarrow \left| \sqrt{16 - 2x} - 2 \right| < \epsilon.$$

**Problem 9.3** To what limit does the above  $\delta - \epsilon$  argument correspond? Fill in the blanks:



Problem 9.4 If possible, sketch the graph of a function so that

- f(0) = 0, and
- $\lim_{x \to 0} f(x)$  is undefined.

If this cannot be done, write the word "Impossible."

Problem 9.5 If possible, sketch the graph of a function so that

- $\lim_{x \to 2^+} f(x) = 3,$
- $\lim_{x \to 2^-} f(x) = 3,$
- f(x) is discontinuous at x = 2.

If this cannot be done, write the word "Impossible."

**Problem 9.6** True or false, and explain: if  $\lim_{x\to 2} g(x) = 6$ , then  $\lim_{x\to 2^+} g(x) = 6$  and  $\lim_{x\to 2^-} g(x) = 6$ .

**Problem 9.7** True or false, and explain:  $h(x) = \frac{x^2 - 1}{x - 1}$  is continuous at x = 1.

Problem 9.8 Calculate

$$\lim_{x \to -\infty} \frac{x^2 - 5x + 4}{2x^2 + x - 10}$$

Problem 9.9 Calculate

$$\lim_{x \to 4^-} \frac{\sqrt{x-2}}{x-4}$$

Problem 9.10 Calculate

$$\lim_{x \to 2^{-}} \frac{x-3}{x^2+4x+4}$$

Problem 9.11 Fill in the blank to make this sentence true, if possible: The function

$$f(x) = \begin{cases} \frac{x^2 - x}{x^2 - 7x + 6}, & x \neq 1, \\ \underline{\qquad}, & x = 1 \end{cases}$$

is continuous at x = 1. If not possible, write the word "Impossible."

Problem 9.12 Calculate

$$\lim_{x \to 4^-} \frac{x^2 - 6x + 8}{x^2 - 3x - 4}$$

Problem 9.13 Fill in the blank to make this sentence true: The function

$$f(x) = \begin{cases} \frac{\sin 3x}{2x}, & x \neq 0, \\ \\ \underline{\qquad}, & x = 0 \end{cases}$$

is continuous at x = 0.