

# Math 114 Practice Test 1

Instructor: Jay Daigle

**Problem 1.**

(a) Directly from the definition of a limit, compute with proof  $\lim_{x \rightarrow -2} \frac{x}{x+4}$

(b) Directly from the definition, compute with proof  $\lim_{x \rightarrow 3} \frac{2x^2 - 10x + 12}{x - 3}$ .

**Problem 2.**

Let

$$f(x) = \begin{cases} 5 & x < -1 \\ 2 & x > -1 \end{cases}$$

(a) Directly from the definition, compute with proof  $\lim_{x \rightarrow 1} f(x)$ .

(b) Directly from the definition of a limit, prove that  $\lim_{x \rightarrow -1} f(x)$  does not exist.

**Problem 3.**

Let

$$g(x) = \begin{cases} x - 3 & x < 3 \\ 2x + 1 & x > 3 \end{cases}$$

(a) Directly from the definition, compute with proof  $\lim_{x \rightarrow 0} g(x)$ .

(b) Directly from the definition of a limit, prove that  $\lim_{x \rightarrow 3} g(x)$  does not exist.

**Problem 4.** (a) Directly from the definition, prove that  $\lim_{x \rightarrow -\infty} \frac{x}{x-3} = 1$ .

(b) Directly from the definition, prove that  $\lim_{x \rightarrow -4} \frac{x}{4+x} = \pm\infty$ .

**Problem 5.**

(a) Directly from the definition, prove that  $\lim_{x \rightarrow +\infty} x^2 + x + 1 = +\infty$ .

(b) Directly from the definition, prove that  $\lim_{x \rightarrow -2} \frac{x}{(x+2)^2} = -\infty$ .