GOAL: This quiz is designed to illuminate your understanding of limits, visually, computationally and conceptually.

1. (20 points TOTAL.) Consider the two unknown linear functions $f(x)$ and $g(x)$ graphed in the figure above. The two lines have different $y$-intercepts but share the same $x$-intercept.

Evaluate the following limits. In each case, EXPLAIN YOUR ANSWER. If you do not think the limit exists, explain why.

(a) (3 points.) $\lim_{x \to 0^-} f(x)$

(b) (3 points.) $\lim_{x \to a^+} g(x)$

(c) (3 points.) $\lim_{x \to 0} \frac{f(x)}{g(x)}$

(d) (3 points.) $\lim_{x \to 0} f(x)g(x)$

(e) (3 points.) $\lim_{x \to 0} 4f(x) - 5g(x)$
(f) (5 points) \( \lim_{x \to \infty} \frac{f(x)}{g(x)} \) [HINT: Use similar triangles to obtain a simple algebraic relationship between \( f(x) \) and \( g(x) \)]

**BONUS (5 points)** Evaluate \( \lim_{x \to a} \frac{f(x)}{g(x)} \). Describe carefully what techniques you use to find the value of the limit, if it exists, or explain why the limit doesn't exist.