

Name: _____

_____ / 25

Circle one: Rhodes (F01) | Bueler (F02)

25 points possible. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. [5 points] Evaluate the limit. Show work and use proper limit notation for full credit.

$$\lim_{h \rightarrow 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h}$$

2. [5 points] Evaluate the limit. Show work and use proper limit notation for full credit.

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

3. [4 points]

- a. Why is the following not a true statement?:

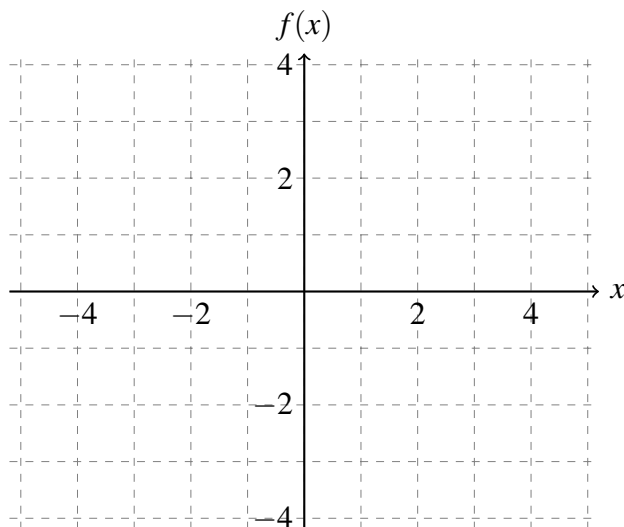
$$\frac{x^2 + 5x}{x} = x + 5$$

- b. Explain why the following equation *is* correct:

$$\lim_{x \rightarrow 0} \frac{x^2 + 5x}{x} = \lim_{x \rightarrow 0} x + 5$$

4. [6 points] Consider the function $f(x) = \begin{cases} x^2 + 1 & \text{if } x < 0 \\ -1 & \text{if } x = 0 \\ 1 - 2x & \text{if } x > 0 \end{cases}$.

a. On the axes below, sketch a graph of $f(x)$.



b. Evaluate the limit, or explain why it does not exist:

$$\lim_{x \rightarrow 0} f(x)$$

c. Is f continuous at $x = 0$? Explain using the definition of continuity.

5. [5 points] Use the Intermediate Value Theorem to show that there is a root of the equation $x - 3 \cos(x) - 6 = 0$ in the interval $(0, \pi)$.