

Name: \_\_\_\_\_

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**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.

$$\lim_{x \rightarrow -3} \frac{2x + 6}{x^2 + 7x + 12}$$

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

$$\lim_{h \rightarrow 0} \frac{\frac{1}{2+h} - \frac{1}{2}}{h}$$

3. [4 points]

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

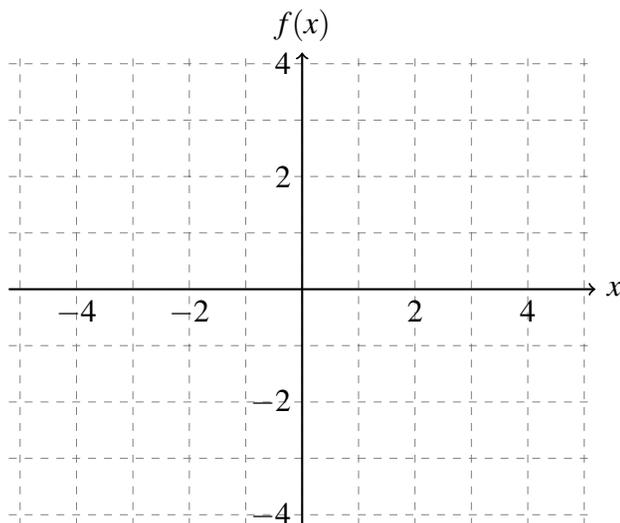
$$\frac{x^2 - 7x}{x} = x - 7$$

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

$$\lim_{x \rightarrow 0} \frac{x^2 - 7x}{x} = \lim_{x \rightarrow 0} x - 7$$

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

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  $5 - x + 2 \cos(x) = 0$  in the interval  $(0, \pi)$ .