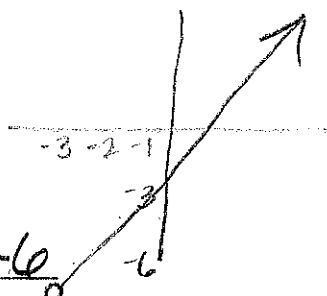


- 1) $f(a)$ is defined 2) $\lim_{x \rightarrow a} f(x)$ exists 3) $\lim_{x \rightarrow a} f(x) = f(a)$

Limits and Continuity
Calculus Concepts
Unit 1 - Worksheet 3

Name key
Date

1. Let $f(x) = \frac{x^2 - 9}{x + 3} = \frac{(x+3)(x-3)}{x+3}$



a. $\lim_{x \rightarrow -3^-} f(x) = -6$

c. $\lim_{x \rightarrow -3^+} f(x) = -6$

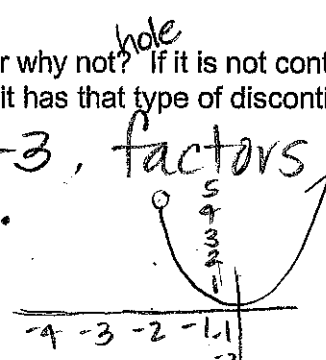
b. $\lim_{x \rightarrow -3^+} f(x) = -6$

d. $f(-3) = \text{und.}$

e. Is continuous at $x = -3$? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

#1
X

Not cont, hole @ $x = -3$, factors cancel on top: bottom
 $f(-3)$ is und.



2. Let $f(x) = \begin{cases} 3x + 4 & x \leq -2 \\ x^2 + 1 & x > -2 \end{cases}$

a. $\lim_{x \rightarrow -2^-} f(x) = -2$

c. $\lim_{x \rightarrow -2^+} f(x) = \text{dne}$

b. $\lim_{x \rightarrow -2^+} f(x) = 5$

d. $f(-2) = -2$

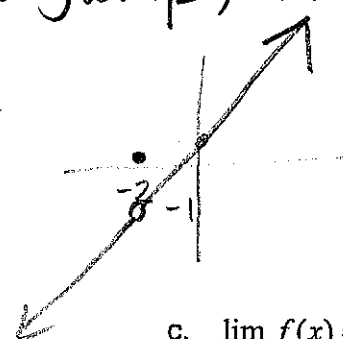
e. Is continuous at $x = -2$? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

#2
X

no, $\lim_{x \rightarrow -2} \text{dne}$, it's a jump, it's piecewise



3. Let $f(x) = \begin{cases} \frac{x^2 + 3x + 2}{x + 2} & x \neq -2 \\ \frac{1}{2} & x = -2 \end{cases}$



a. $\lim_{x \rightarrow -2^-} f(x) = -1$

c. $\lim_{x \rightarrow -2^+} f(x) = -1$

b. $\lim_{x \rightarrow -2^+} f(x) = -1$

d. $f(-2) = \frac{1}{2}$

e. Is continuous at $x = -2$? Why or why not? If it is not continuous, state the type of discontinuity and explain why it has that type of discontinuity.

#3
X

no, $\lim_{x \rightarrow -2} f(x) \neq f(-2)$, a hole, factors cancel on top: bottom