

Who did this worksheet: Key

Period: \_\_\_\_\_

AP Calculus AB: 2.3 Limits of Piecewise Analytically

1.  $f(x) = \begin{cases} 3x - 2, & x < -2 \\ 4x, & x > -2 \end{cases}$  find  $\lim_{x \rightarrow -2} f(x)$  and  $\lim_{x \rightarrow 3} f(x)$

$$\lim_{x \rightarrow -2} f(x) = -8$$

$$\lim_{x \rightarrow 3} f(x) = 12$$

2.  $f(x) = \begin{cases} x^2 + 6x - 2, & x \leq -1 \\ x - 5, & x > -1 \end{cases}$  find  $\lim_{x \rightarrow -1} f(x)$  and  $\lim_{x \rightarrow -3} f(x)$

$$\lim_{x \rightarrow -1} f(x) \quad \begin{array}{l} L: (-1)^2 + 6(-1) - 2 = -7 \\ R: (-1) - 5 = -6 \end{array} \rightarrow \boxed{\text{DNE}}$$

$$\lim_{x \rightarrow -3} f(x) = (-3)^2 + 6(-3) - 2 = \boxed{-11}$$

3.  $f(x) = \begin{cases} \frac{x-2}{x-3}, & x \leq 3 \\ \frac{x+2}{x-3}, & x > 3 \end{cases}$  find  $\lim_{x \rightarrow 3} f(x)$  and  $\lim_{x \rightarrow -1} f(x)$

$$\lim_{x \rightarrow 3} f(x) \quad L: \frac{2.9-2}{2.9-3} = \frac{+}{-} = -\infty \rightarrow \boxed{\text{DNE}}$$

$$R: \frac{3.1+2}{3.1-3} = \frac{+}{+} = \infty$$

$$\uparrow \frac{3}{4}$$

4.  $f(x) = \begin{cases} x^2 - 3x + 2, & x = 5 \\ 4x - 19, & x \neq 5 \end{cases}$  find  $\lim_{x \rightarrow 5} f(x)$  and  $\lim_{x \rightarrow 2} f(x)$

$$\uparrow \boxed{1}$$

$$\uparrow \boxed{-11}$$

$$5. f(x) = \begin{cases} x+3, & x=2 \\ \frac{x-2}{2x^2-3x-2}, & x \neq 2 \end{cases} \text{ find } \lim_{x \rightarrow 2} f(x) \text{ and } \lim_{x \rightarrow -\frac{1}{2}} f(x)$$

$$\lim_{x \rightarrow 2} f(x) = \frac{1}{5}$$

$$\lim_{x \rightarrow -\frac{1}{2}} f(x) = \frac{(-\frac{1}{2}) - 2}{2(-\frac{1}{2})^2 - 3(-\frac{1}{2}) - 2} = \frac{-\frac{1}{2} - 2}{2(\frac{1}{4}) + 3(\frac{1}{2}) - 2} = \frac{-\frac{5}{2}}{\frac{2}{4} + \frac{3}{2} - 2} = \frac{-\frac{5}{2}}{\frac{2}{4} + \frac{6}{4} - \frac{8}{4}} = \frac{-\frac{5}{2}}{\frac{0}{4}} \rightarrow \text{undef}$$

cant divide by zero

$$6. f(x) = \begin{cases} \frac{-x}{x+4}, & x < 2 \\ \frac{x^2+2x-8}{2x^2-3x-2}, & x > 2 \end{cases} \text{ find } \lim_{x \rightarrow 2} f(x) \text{ and } \lim_{x \rightarrow -4} f(x)$$

$$\lim_{x \rightarrow 2} f(x) = \text{DNE}$$

$$\lim_{x \rightarrow -4} f(x) = \text{DNE}$$

$$7. f(x) = \begin{cases} x^2 - 3x + 4, & x = 3 \\ kx - 5, & x \neq 3 \end{cases} \text{ find the value of } k, \text{ such that } \lim_{x \rightarrow 3} f(x) = f(3)$$

$$k = 3$$