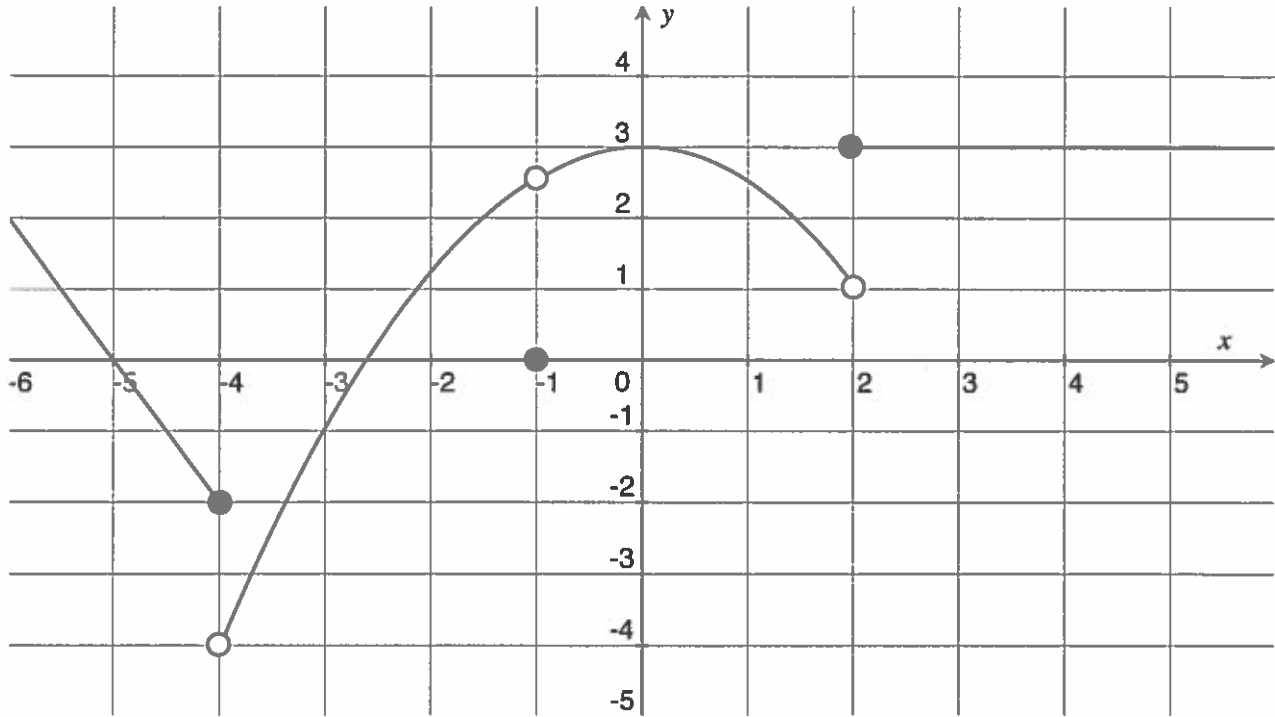


Who are you? key

Period: _____

AP Calculus AB: 2.2 Limits Analytically

1. First do some warm-up. Find the limits for this graph below.



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

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

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

$$\lim_{x \rightarrow -1} f(x) \approx 2.5$$

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

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

$$\lim_{x \rightarrow -5} f(x) = \circ$$

$$\lim_{x \rightarrow 4} f(x) = 3$$

2. On the above graph, how would the limit as x approached 2 change, if when $x > 2$ $f(x) = 1$ instead of $f(x) = 3$?

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

3. Define a limit in your own words.

x	$g(x)$
1.10	2.35
1.15	2.40
1.2	2.45
1.25	Error
1.3	2.55
1.35	2.60

Find the limits below using the table to the left.

$$\lim_{x \rightarrow 1.25} g(x) = 2.5$$

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1) $\lim_{x \rightarrow -3} x^2 + 5x + 1 = -5$

2) $\lim_{x \rightarrow -2} 4x^3 - 2x + 5 = -23$

3) $\lim_{x \rightarrow -1} \frac{x^2 + 4x - 5}{x - 1} = 4$

4) $\lim_{x \rightarrow \frac{5\pi}{6}} \tan(x) = \frac{-\sqrt{3}}{3}$

5) $\lim_{x \rightarrow 1} \frac{x^2 + 4x - 5}{x - 1} = 6$

6) $\lim_{x \rightarrow 4} \frac{x - 4}{x^2 - 16} = \frac{1}{8}$

7) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin(5x)}{x} = \frac{\sin(\frac{5\pi}{4})}{\frac{\pi}{4}} = \frac{-\frac{\sqrt{2}}{2}}{\frac{\pi}{4}} = \frac{-4\sqrt{2}}{2\pi}$

8) $\lim_{x \rightarrow 2} \frac{2x^2 - x - 6}{x - 2} = 7$

9) $\lim_{x \rightarrow 2^-} \frac{x + 1}{x - 2} = \frac{+}{-} = \boxed{-\infty}$

10) $\lim_{x \rightarrow \frac{\pi}{2}} \frac{x \cdot \cos^2(x)}{1 - \sin^2(x)} = \frac{0}{0}$
 $\frac{x(1 - \sin^2(x))}{1 - \sin^2(x)} = x = \boxed{\frac{\pi}{2}}$

11) $\lim_{x \rightarrow 2^+} \frac{x + 1}{x - 2} = \infty$

12) $\lim_{x \rightarrow 4^-} \frac{x - 3}{x - 4} = -\infty$

13) $\lim_{x \rightarrow 2} \frac{x + 1}{x - 2} = \text{DNE}$

14) $\lim_{x \rightarrow 4} \frac{x - 3}{x - 4} = \text{DNE}$

L 1.9 $\rightarrow -\infty$

R 2.1 $\rightarrow \infty$

15) $\lim_{x \rightarrow -1} \frac{x^2}{x + 1} = \text{DNE}$

16) $\lim_{x \rightarrow 2} \frac{-x}{|x - 2|} = -\infty$

L 1.9 $= -\infty$

R 2.1 $= -\infty$

17) This is a problem from the AP calculus exam. Find the limit.

18) $\lim_{x \rightarrow 1} \frac{-3}{\ln(x)} = \text{DNE}$

L: 1.9 $\rightarrow \infty$

R: 1.1 $\rightarrow -\infty$

$\lim_{x \rightarrow a} \frac{x - a}{x^2 - a^2} = \frac{x - a}{(x - a)(x + a)} = \frac{1}{x + a}$

$\frac{1}{a + a} = \boxed{\frac{1}{2a}}$