Today's Plan:

Learning Target (standard): I will graph functions and describe how the concept of a limit applies to specific x-values. I will calculate limits analytically.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

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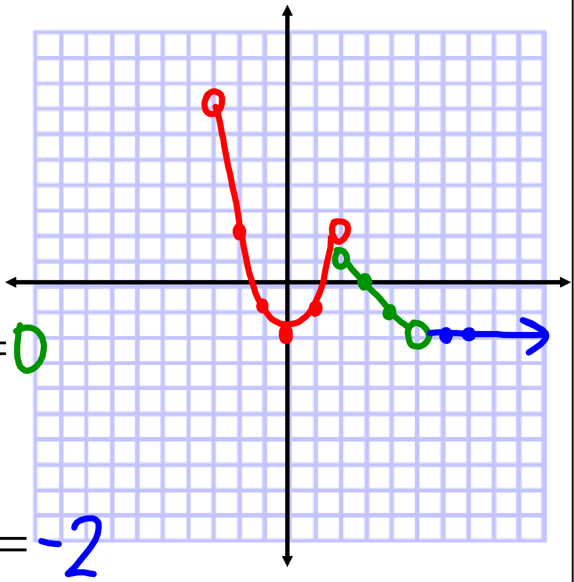
1) 4
2) 19
3) $^1/_9$
4) -4
5) $^{17}/_{13}$
6) $^1/_{10}$
7) 32
8) $3x^2$
9) 2x
10) 3
11) 12
12) DNE
13) DNE
14) DNE
15) DNE
16) -1

Graph:

$$f(x)=\begin{cases} x^2-2 & -3<x<2 \\ 3-x & 2<x<5 \\ -2 & x>5 \end{cases}$$



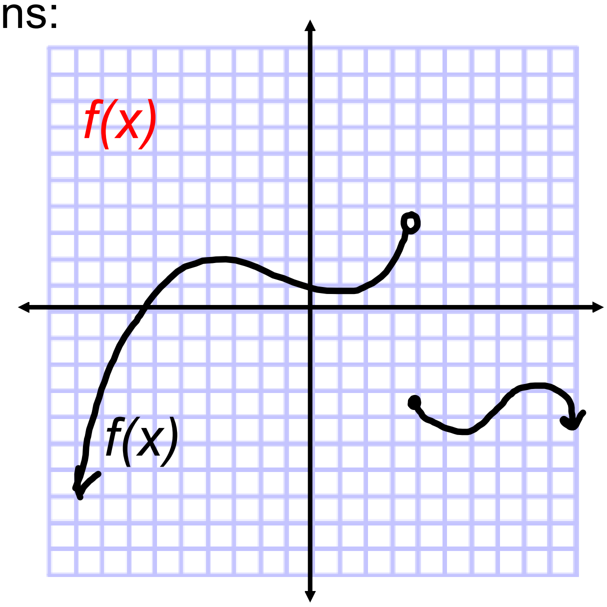
$\lim_{x\to -1} f(x) = -1$ $\lim_{x\to 3} f(x) = 0$

*$\lim_{x\to 2} f(x) =$ DNE $\lim_{x\to 5} f(x) = -2$

Explain the meaning

The limit of the function as x approaches 2 on f(x) does not exist. As the x-values approach 2 on f(x) from the left, the y-values of the function approach 2 from the left. As the x-values approach 2 on f(x) from the right, the y-values of the function approach 1 from the right. In order for a limit to exist, the same y-value must be approached from the left and the right.

Limits of Piecewise Functions:



*$\lim_{x\to 0} f(x) = 1$

Explain the meaning

$\lim_{x\to -8} f(x) = -3$

$\lim_{x\to 4} f(x) =$ DNE

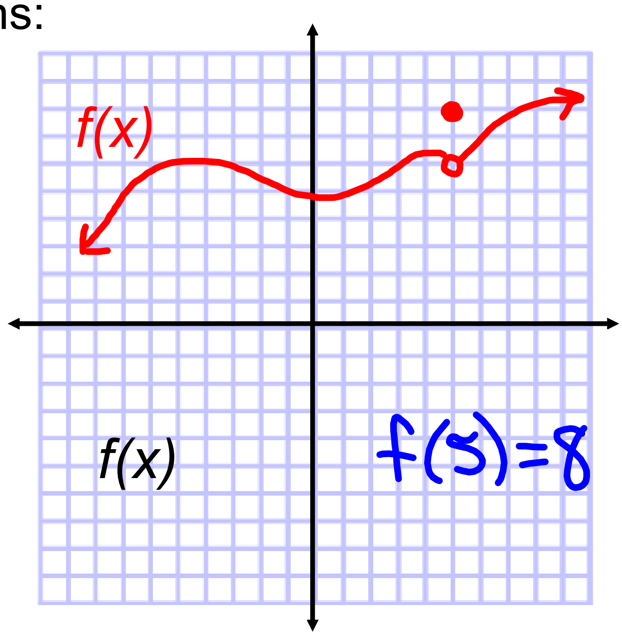
The limit of the function as x approaches 0 is equal to 1 because as the x-values approach 0 on f(x) from the left, the y-values of the function approach 1 from the left. As the x-values approach 0 on f(x) from the right, the y-values of the function also approach 1 from the right. Because the y-values of the function approach 1 from both the left and the right, the limit of the function as x approaches 0 is 1.

Limits of Piecewise Functions:

$$\lim_{x \to -6} f(x) = 6$$

$$\lim_{x \to 2} f(x) = 5$$

$$\lim_{x \to 5} f(x) = 6$$



Evaluate the limit.

$$\lim_{x \to 9} \frac{x-9}{\sqrt{x}-3} = \lim_{x \to 9} \frac{(\sqrt{x}+3)\cancel{(\sqrt{x}-3)}}{\cancel{\sqrt{x}-3}}$$

$$= \lim_{x \to 9} (\sqrt{x}+3)$$

$$= \sqrt{9}+3$$

$$= 3+3$$

$$= 6$$

Evaluate the limit.

$$\lim_{x\to 4}\frac{\sqrt{(x+3)}(x-4)^4}{(2x-8)^2} = \lim_{x\to 4}\frac{\sqrt{x+3}\,(x-4)^2}{(2(x-4))^2}$$

$(2x-8)(2x-8)$

$\underline{2}(x-4)\cdot\underline{2}(x-4)$

$$= \lim_{x\to 4}\frac{\sqrt{x+3}\,\cancel{(x-4)^2}}{4\cancel{(x-4)^2}}$$

$$= \lim_{x\to 4}\frac{\sqrt{x+3}}{4}$$

$$= \frac{\sqrt{4+3}}{4}$$

$$= \frac{\sqrt{7}}{4}$$

Evaluate the limit.

$$\lim_{x\to 1}\frac{\frac{1}{x+1}-\frac{1}{2}}{x-1} = \lim_{x\to 1}\frac{\frac{2-x-1}{2(x+1)}}{x-1}$$

$$= \lim_{x\to 1}\frac{\frac{1-x}{2(x+1)}}{x-1}$$

$$= \lim_{x\to 1}\frac{1-x}{2(x+1)}\cdot\frac{1}{x-1}$$

$$= \lim_{x\to 1}\frac{-1\cancel{(x-1)}}{2(x+1)}\cdot\frac{1}{\cancel{x-1}}$$

$$= \lim_{x\to 1}\frac{-1}{2(x+1)}$$

$$= \frac{-1}{2(1+1)}$$

$$= -\frac{1}{4}$$

Evaluate the limit.

$$\lim_{x\to 9}\frac{x-9}{3-\sqrt{x}} = \lim_{x\to 9}\frac{(\sqrt{x}+3)(\sqrt{x}-3)}{3-\sqrt{x}}$$

$$= \lim_{x\to 9}\frac{-1\cancel{(3-\sqrt{x})}(\sqrt{x}+3)}{\cancel{3-\sqrt{x}}}$$

$$= \lim_{x\to 9} -1(\sqrt{x}+3)$$

$$= -1(\sqrt{9}+3)$$

$$= -6$$

Evaluate the limit.

$$\lim_{x\to 0}\frac{\frac{3}{x^2}}{\frac{2}{x^2}+\frac{105}{x}} = \lim_{x\to 0}\frac{\frac{3}{x^2}}{\frac{2+105x}{x^2}}$$

$$= \lim_{x\to 0}\frac{3}{\cancel{x^2}}\cdot\frac{\cancel{x^2}}{2+105x}$$

$$= \lim_{x\to 0}\frac{3}{2+105x}$$

$$= \frac{3}{2+105(0)}$$

$$= \frac{3}{2}$$

Evaluate the limit.

$$\lim_{x\to 0}\frac{4-\sqrt{16+x}}{x}\cdot\frac{4+\sqrt{16+x}}{4+\sqrt{16+x}}$$

$$=\lim_{x\to 0}\frac{16-(16+x)}{x(4+\sqrt{16+x})}$$

$$=\lim_{x\to 0}\frac{-x}{x(4+\sqrt{16+x})}$$

$$=\lim_{x\to 0}\frac{-1}{4+\sqrt{16+x}}$$

$$=\frac{-1}{4+\sqrt{16+0}}$$

$$=\frac{-1}{8}$$

Assignment:

Limits Practice #1-17

* QUIZ on Monday *