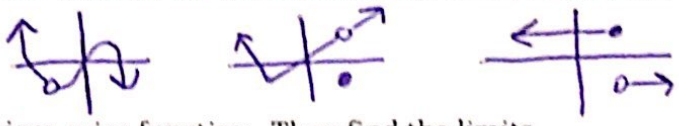
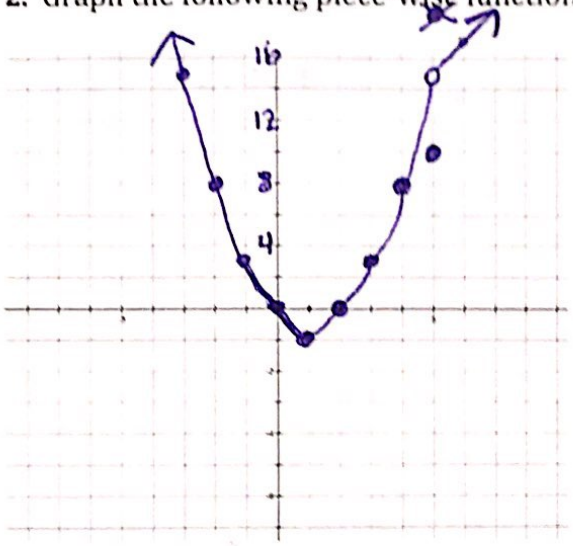
Unit 1 Quizzam Review Name: _____

You will also need to study the first quiz and homework from this unit!!

1. Sketch a graph where the value of the function and the value of the limit are not the same for a particular x-value.



2. Graph the following piece-wise function. Then find the limits.



$$f(x) = \begin{cases} x^2 - 2x & \text{if } x < 5 \\ 10 & \text{if } x = 5 \\ 2x + 5 & \text{if } x > 5 \end{cases}$$

a) $\lim_{x \to 0} f(x)$ 0

b) $\lim_{x \to 6} f(x)$ 17

c) $\lim_{x \to 5^+} f(x)$ 15

d) $\lim_{x \to 5^-} f(x)$ 15

e) $\lim_{x \to 5} f(x)$ 15

Solve the following limits algebraically. Show all necessary work!

3. $\lim_{x \to -5} \frac{x^2+10x+25}{25-x^2} = \lim_{x \to -5} \frac{(x+5)(x+5)}{(5+x)(5-x)}$

$= \lim_{x \to -5} \frac{x+5}{5-x} = \frac{0}{10} = \boxed{0}$

4. $\lim_{x \to 3} \frac{x^3-7x-6}{x^3-27} = \lim_{x \to 3} \frac{(x-3)(x^2+3x+2)}{(x-3)(x^2+3x+9)}$

$3 \mid 1 \;\; 0 \;\; -7 \;\; -6$
$\quad\;\; \downarrow \;\; 3 \;\; 9 \;\; 6$
$\quad 1 \;\; 3 \;\; 2 \;\; | \;\; 0$

$= \frac{9+9+2}{9+9+9} = \boxed{\frac{20}{27}}$

5. $\lim_{x \to 2} \frac{x^3-2x^2+x-2}{x-2} = \lim_{x \to 2} \frac{(x-2)(x^2+1)}{(x-2)}$

$2 \mid 1 \;\; -2 \;\; 1 \;\; -2$
$\quad\;\; \downarrow \;\; 2 \;\; 0 \;\; 2$
$\quad 1 \;\; 0 \;\; 1 \;\; | \;\; 0$

$= 2^2 + 1$

$= \boxed{5}$

6. $\lim_{h \to 0} \frac{4(x+h)-7-(4x-7)}{h}$

$= \lim_{h \to 0} \frac{4x+4h-7-4x+7}{h}$

$= \lim_{h \to 0} \frac{4h}{h} = \boxed{4}$

7. $\lim_{x \to 4} \frac{3x^2-5x-12}{x-3} = \frac{3(4)^2-5(4)-12}{4-3}$

$= \frac{3 \cdot 16 - 20 - 12}{1}$

$= 48 - 32 = \boxed{16}$

8. $\lim_{x \to -3} \frac{x^2+7x+12}{x^3+5x^2+7x+3} = \lim_{x \to -3} \frac{(x+3)(x+4)}{(x+3)(x^2+2x+1)}$

$-3 \mid 1 \;\; 5 \;\; 7 \;\; 3$
$\quad\;\; \downarrow \;\; -3 \;\; -6 \;\; -3$
$\quad 1 \;\; 2 \;\; 1 \;\; | \;\; 0$

$= \frac{-3+4}{9-6+1} = \boxed{\frac{1}{4}}$

*Solve **graphically.***

9. $\lim_{x\to 0}\frac{x}{\sin(x)}$ (make sure calc. is in radians)

1

10. $\lim_{x\to 5}\sqrt{x^2-25}$

DNE

11. $f(x)=\frac{\ln(x)}{(x-1)}$

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

12. $g(x)=\frac{x-1}{\sqrt{x}-1}$

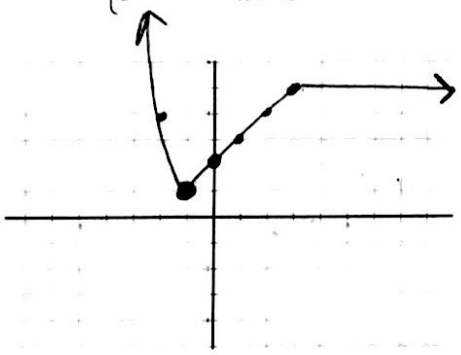
$\lim_{x\to 1} g(x) =$ 2

13. $h(x)=\sqrt{(x^2-9)}$

$\lim_{x\to -3} h(x) =$ DNE

Graph each piece-wise function. Answer the following questions.

14. $f(x)=\begin{cases} x^2 & x<-1 \\ x+2 & -1\le x\le 3 \\ 5 & x>3 \end{cases}$



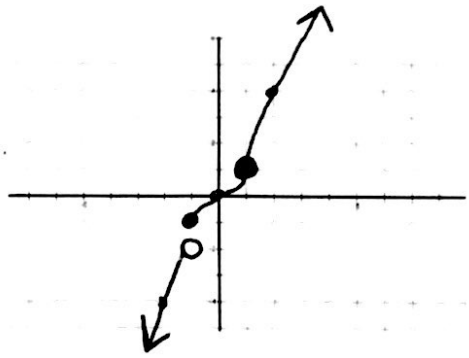
a. Find f(x) when x = 4. 5

b. Find the limit as x approaches -1. 1

c. Find the limit as x approaches 0. 2

d. Is there anywhere the limit DNE? no ☺

15. $g(x)=\begin{cases} 2x & x<-1 \\ x^3 & -1\le x<1 \\ 3x-2 & x\ge 1 \end{cases}$



a. Find g(x) when x = -1. -1

b. Find the limit as x approaches -1. DNE

c. Find the limit as x approaches -1^+. -1

d. Find the limit as x approaches 2. 4