Pre-Calculus – Unit 3

Name: _____ Date:_____ Period: _____ **ID: 2**

Unit 3 Corrective Assignment – Function Analysis

Pre-Calculus

Find the ***domain*** of the indicated function. Write your answers using inequality notation. ***Classify*** all discontinuities.

1. $h(t) = \dfrac{\sqrt{t+49}}{t-7}$ ≥ 0 $\neq 0$

$t \geq -49$, $t \neq 7$

2. $f(x) = \dfrac{8+x}{64+x^2} \neq 0$

$x^2 \neq -64$

$x \neq \pm 8i$

D: $\mathbb{R}$

Continuous on its domain

3. $g(w) = \dfrac{w^2-3w}{2w^3+w^2-21w}$

Dom: $\mathbb{R}$

$w \neq 0,\ w \neq 3,\ w \neq -\frac{7}{2}$

holes V.A.

4.

Domain: $(-\infty, -2] \cup [2, \infty)$

Absolute max/min value(s): Abs max: -2

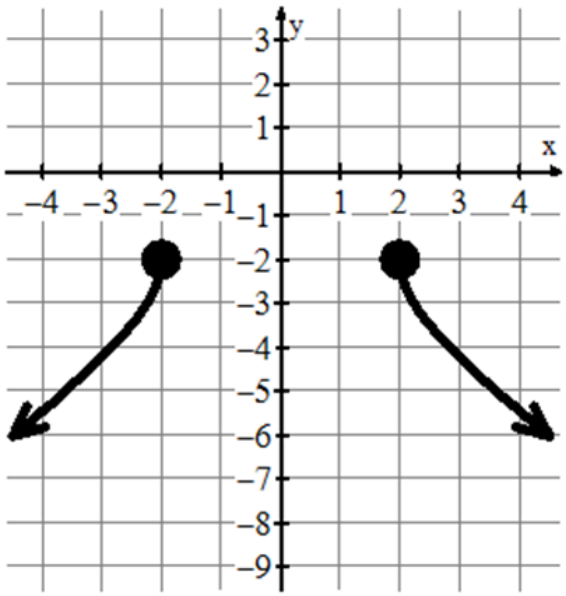
Local extrema that are NOT absolute: none

Increasing: $(-\infty, -2)$

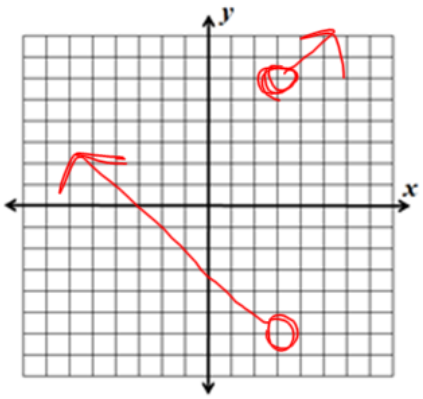
Decreasing: $(2, \infty)$

Left End-behavior: $\lim_{x \to -\infty} f(x) = -\infty$

Right End-behavior: $\lim_{x \to \infty} f(x) = \infty$



5. $f(x) = \dfrac{x^2-9}{|x-3|}$



Domain: $(-\infty, 3) \cup (3, \infty)$

Absolute max/min value(s): none

Local extrema that are NOT absolute: none

Increasing: $(3, \infty)$

Decreasing: $(-\infty, 3)$

Left End-behavior: $\lim_{x \to -\infty} f(x) = \infty$

Right End-behavior: $\lim_{x \to \infty} f(x) = \infty$

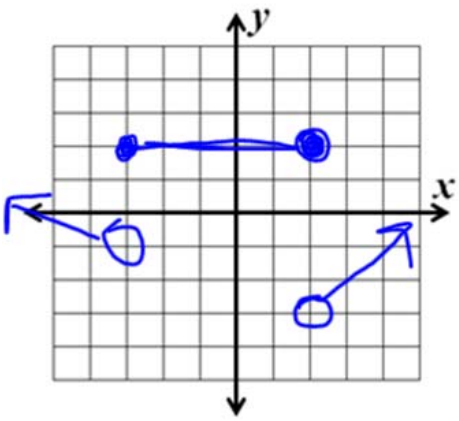
Find the value of the given function at the indicated domain value.

$$g(x)=\begin{cases} x^2+7x-5, & x<-5 \\ 5-x^3, & -3\le x<5 \\ -\sqrt{x-9}, & x\ge 5 \end{cases} \qquad h(x)=\begin{cases} -x^2-4x+6, & x<-2 \\ \frac{2}{3}x-5, & -2<x<5 \\ |x-15|-2, & x\ge 5 \end{cases}$$

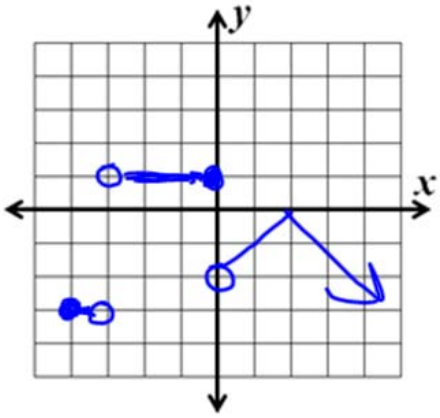
6. $g(-4)=$ DNE	7. $g(5)=$ DNE	8. $h(10)=$ 3	9. $h(-2)=$ DNE
10. $h(5)=$ 8	11. $h(3)=$ -3	12. $g(9)=$ 0	13. $h(-3)=$ 9

Graph the following piecewise functions.

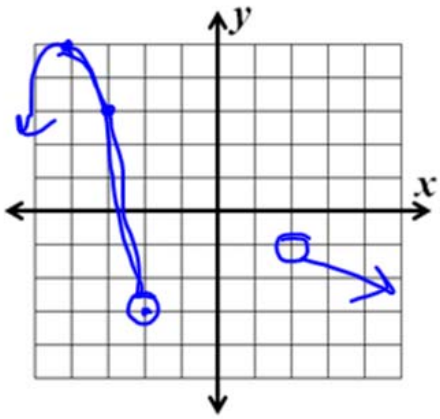
14. $f(x)=\begin{cases} -\frac{1}{3}x-2, & x<-3 \\ 2, & -3\le x\le 2 \\ x-5, & x>2 \end{cases}$



15. $g(x)=\begin{cases} -3, & -4\le x<-3 \\ 1, & -3<x\le 0 \\ -|x-2|, & x>0 \end{cases}$



16. $h(x)=\begin{cases} -2(x+4)^2+5, & x\le -2 \\ -\frac{1}{2}x, & x>2 \end{cases}$



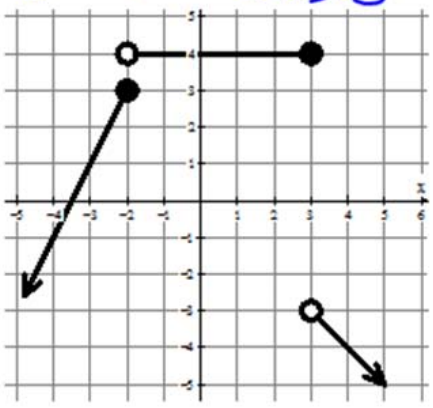
Skills Review: Solve or evaluate.

17. $\sqrt{-245}$ $7i\sqrt{5}$	18. $7x^2+8=358$ $x=\pm 5\sqrt{2}$	19. $-3(x+2)^2-1=-49$ $x=2$ or $x=-6$	20. $2(x+6)^2=-68$ $x=-6\pm i\sqrt{34}$

Given the graph of f, write out the function's equation. Use a linear expression ($mx + b$) for straight lines, absolute values if there is a "V" graph.

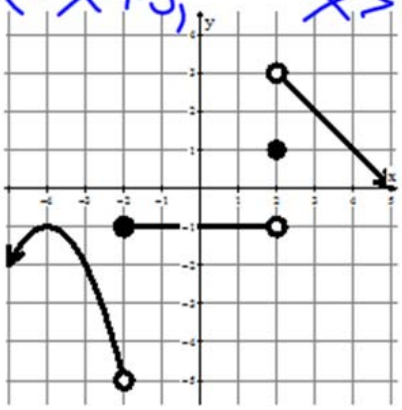
21.

$$f(x) = \begin{cases} 2x+7, & x \le -2 \\ 4, & -2 < x \le 3 \\ -x, & x > 3 \end{cases}$$



22.

$$f(x) = \begin{cases} -(x+4)^2 - 1, & x < -2 \\ -1, & -2 \le x < 2 \\ 1, & x = 2 \\ -x+5, & x > 2 \end{cases}$$



23. Is this function continuous? (SHOW WORK!)

$$f(x) = \begin{cases} 20 - 3x, & x < 8 \\ -\sqrt{x-4}, & x \ge 8 \end{cases}$$

$20 - 3(8) = -\sqrt{(8)-4}$

$-4 = -\sqrt{4}$

$-4 = -2$ X

No.

24. What value(s) of k would make the function continuous?

$$h(x) = \begin{cases} \sqrt{13 - x}, & x \le -87 \\ k^2 - 3k, & x > -87 \end{cases}$$

$\sqrt{13-(-87)} = k^2 - 3k$

$10 = k^2 - 3k$

$0 = k^2 - 3k - 10$

$0 = (k-5)(k+2)$

$k = 5$ or $k = -2$

25. Mr. Kelly wants to create a rectangular feeding pen for his chickens, but only has 70 meters of fencing. He decides to use the side of his house as one side of the pen.

a. If x represents the width of the pen, express its area A in terms of x. (The side of Kelly's house is the length.)

$A(x) = 70x - 2x^2$

b. What is the domain of the function A (determined by the physical restrictions)?

$0 < x < 35$

26. Rewrite the function $f(x) = \frac{1}{3}|x - 15| - 8$ as a piecewise function.

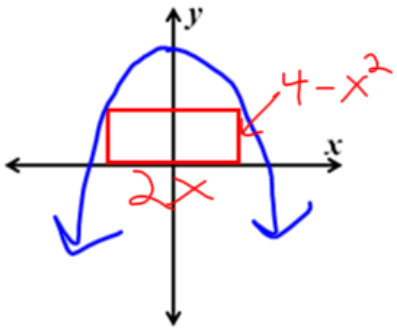
$$f(x) = \begin{cases} -\frac{1}{3}x - 3, & x \le 15 \\ \frac{1}{3}x - 13, & x > 15 \end{cases}$$

27. A rectangle has its base on the x-axis and its two upper corners on the parabola $y = 4 - x^2$.

a. Draw this scenario on the coordinate plane to the right, and draw one possible rectangle.

b. Label the base and height of your rectangle in terms of x.

$b = 2x$ $\quad h = 4 - x^2$



c. Find the function $A(x)$ that represents the area of the rectangle.

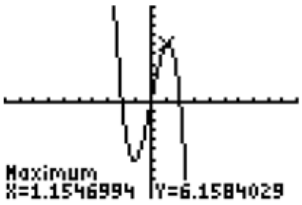
$A(x) = 8x - 2x^3$

d. What is the largest possible area of this rectangle?

6.158

e. At what x-value should the rectangle be drawn for the largest area?

1.155



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28. Kelly is headed off to Hickville, New York and is renting a car to get there from Sully's house in O-high-O. He needs to rent a car to get there and finds one car rental agency that charges \$0.21 per mile if the total mileage does not exceed 75. If the total mileage exceeds 75, the agency charges \$0.21 per mile for the first 75 miles and only \$0.16 per mile for each mile over 75. If m represents the number of miles a rented vehicle is driven, express the mileage charge $C(m)$ as a function of m. Find $C(24)$ and $C(205)$.

$0.21(75) = 0.16(75) + b$

$15.75 = 12 + b$

$3.75 = b$

$$C(m) = \begin{cases} 0.21m, & m \le 75 \\ 0.16m + 3.75, & m > 75 \end{cases}$$

$C(24) = \$5.04$

$C(205) = \$36.55$