

May 2nd

Due Today: 11.7 + delta

Due Next: 11.8

Unit 11: Function Operations

Lesson 11.8: Special Functions

**Check your 11.7 Practice
packet with the answer keys
at your tables**

HW 4

$$a(x) = x^2 - 3, \quad b(x) = -(x+3)^2 + 2$$

$$x^2 - 3 = -(x+3)^2 + 2$$

$$\begin{array}{l} (x+3)(x+3) \\ -(x^2 + 6x + 9) + 2 \end{array}$$

$$-x^2 - 6x - 9 + 2$$

$$\begin{array}{r} x^2 - 3 \\ + x^2 + 6x + 7 \\ \hline 2x^2 + 6x + 4 = 0 \\ \hline \end{array} \quad \begin{array}{r} -x^2 - 6x - 7 \\ + x^2 + 6x + 7 \\ \hline \end{array}$$

$$\frac{2x^2 + 6x + 4}{2} = \frac{0}{2}$$

$$x^2 + 3x + 2 = 0$$

$$(x+2)(x+1) = 0$$

$$x = -2, -1$$

$$y = x^2 - 3$$

$(-2)^2 - 3$		$(-1)^2 - 3$
$4 - 3$		$1 - 3$
1		-2

$x = -2, y = 1 \text{ and } x = -1, y = -2$

Vertex Form $(x-h)^2 + v = 0$
"shifting Method" vertex (h, v)

Standard Form $ax^2 + bx + c = 0$

HW _____

HW _____

FUNCTIONS

Function or Relation?

Families

Domain and Range

Graphing by Shifting

Writing Equations in Vertex Form

Solving Systems Graphically

Solving Systems Algebraically

Modeling with Functions

Special Functions - Recursive + Composition

Piecewise Functions

COMPOSITION OF FUNCTIONS

$$f(x) = 2x + 1$$

$$g(x) = x^2 - 5$$

a) What is $f(2)$?

$$f(2) = 2(2) + 1$$

$$= 4 + 1$$

$$f(2) = 5$$

b) what is $g(2)$?

$$g(2) = (2)^2 - 5$$

$$= 4 - 5$$

$$g(2) = -1$$

c) what is $f(g(2))$?

$$f(g(2)) = f(-1)$$

$$f(-1) = 2(-1) + 1$$

$$= -2 + 1$$

$$f(g(2)) = -1$$

d) what is $f(f(2))$?

$$f(f(2)) = f(5)$$

$$f(5) = 2(5) + 1$$

$$f(f(2)) = 11$$

e) What is the function $g(f(x))$ in standard form?

plug $f(x)$ into $g(x)$

$$g(f(x)) = (2x + 1)^2 - 5$$

$$(2x + 1)(2x + 1) - 5$$

$$4x^2 + 2x + 2x + 1$$

$$4x^2 + 4x + 1 - 5$$

$$g(f(x)) = 4x^2 + 4x - 4$$

0, 1, 1, 2, 3, 5, 8, 13

RECURSIVE FUNCTIONS

$$f(n) = 2(f(n-1)) + 3$$

$$f(6) = 2(f(5)) + 3$$

$$f(5) = 2(f(4)) + 3$$

$$f(0) = 5$$

a) What is $f(1)$?

$$\begin{aligned} f(1) &= 2(f(0)) + 3 \\ &= 2(5) + 3 \end{aligned}$$

$$f(1) = 13$$

b) What is $f(3)$?

$$\begin{aligned} f(2) &= 2(f(1)) + 3 \\ &= 2(13) + 3 \\ &= 26 + 3 \end{aligned}$$

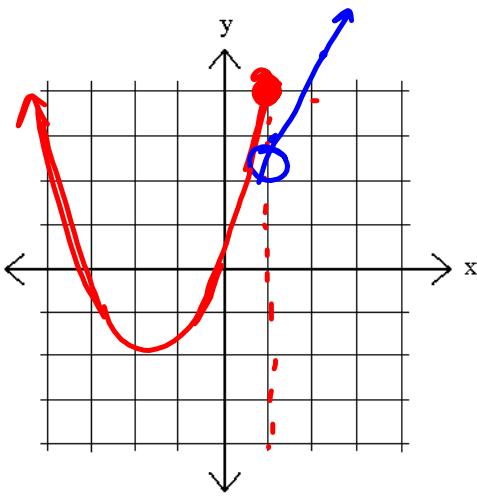
$$f(2) = 29$$

$$\begin{aligned} f(3) &= 2(f(2)) + 3 \\ &= 2(29) + 3 \end{aligned}$$

$$= 58 + 3$$

$$f(3) = 61$$

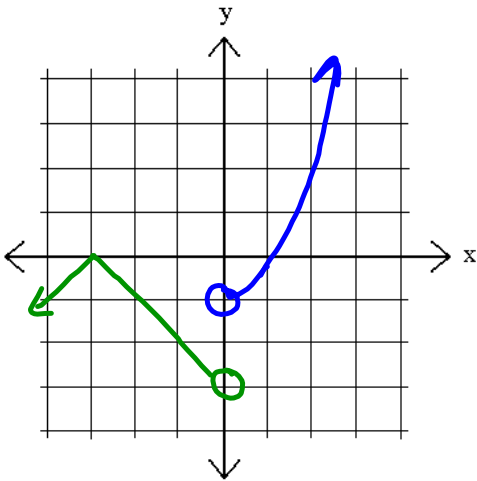
PIECEWISE FUNCTIONS



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

Handwritten annotations: "function" with an arrow pointing to the function expressions, and "domain" with an arrow pointing to the domain conditions.

PIECEWISE FUNCTIONS



$$g(x) = \begin{cases} -|x+3|, & x < 0 \\ x^2-1, & x > 0 \end{cases}$$

$$g(-3) = -|-3+3|$$

$$= -|0|$$

$$g(-3) = 0$$

$$g(12) = (12)^2 - 1$$

$$g(12) = 143$$

$$g(0) = \text{DNE}$$

Unit 11: Function Operations

Lesson #	Name	Recap	HW
11.1	Families of Functions		HW 11.1
11.2	Domain and Range of Functions		HW 11.2
11.3	Shifting Functions		Finish 11.3 QUIZ FRIDAY Delta
11.4	QUIZ + Delta		
11.5	Solving Systems Graphically		HW 11.5 * Calculator *
11.6	Solving systems algebraically		HW 11.6 QUIZ!
11.7	Quiz + More solving systems		HW 11.7 Spring Break: DELTA MATH
11.8	Special Functions		HW 11.8