

Algebra II

G-6

Composition of Functions

Identify the parts of a function:

Tells us the input variable.

Name

$$f(x) = x^2 + 3x + 5$$

output acts like y

rule or equation

$$f(x) = 4x - 5 \quad g(x) = x + 3 \quad h(x) = x^2$$

$$f(5) = 4(5) - 5 = 15$$

$$g(5) = (5) + 3 = 8$$

$$h(y) = (y)^2$$

$$g(\star) = (\star) + 3$$

$$f(x) = 4x - 5 \quad g(x) = x + 3 \quad h(x) = x^2$$

$$f(g(7)) = g(7) = (7) + 3 = 10$$

$$F(10) = 4(10) - 5 = 35$$

$$h(f(2)) = F(2) = 4(2) - 5 = 3$$

$$h(3) = (3)^2 = 9$$

$$g(h(x)) = h(x) = x^2$$

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

$$g(g(1)) = g(1) = (1) + 3 = 4$$

$$g(4) = (4) + 3 = 7$$

$$f(g(h(0))) = h(0) = (0)^2 = 0$$

$$g(0) = (0) + 3 = 3$$

$$F(3) = 4(3) - 5 = 7$$

Formal Definition of Inverse

Two functions $f(x)$ and $g(x)$ are inverses iff \iff if and only if

$$a) f(g(x)) = x$$

$$b) g(f(x)) = x$$

Notation for inverse functions:

The inverse of $f(x)$ is written $f^{-1}(x)$

$$f(x) = 3x - 2 \quad g(x) = \frac{x+2}{3}$$

$$a) f(g(x)) = f\left(\frac{x+2}{3}\right) = 3\left(\frac{x+2}{3}\right) - 2$$

$$= x + 2 - 2$$

$$= x$$

$$b) g(f(x)) = g(3x - 2) = \frac{(3x - 2) + 2}{3} = \frac{3x}{3} = x$$

$$g(x) = f^{-1}(x)$$

Assignment:

Handout G-6
1-25 all