Today's Plan:

Learning Target (standard): I will evaluate composite functions. I find inverse functions.

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.

p.405 #2-24 even

$2) g(f(0)) = -13$

$4) g(f(-2)) = -29$

$6) g(f(x)) = 8x - 13$

$8) f(h(0)) = 4$

$10) f(h(-1)) = 3$

$12) f(h(x)) = x + 4$

$14) h(g(0)) = 1$

$16) h(g(-2)) = 5$

$18) h(g(x)) = x^2 + 1$

$20) h(f(0)) = 5$

$22) h(f(-2)) = 11$

$24) h(f(x)) = 3x^2 + 3x + 5$

Evaluate each composite function:

$f(x) = -x^2 + 3 \quad g(x) = x^3 - 1$

① $f(g(x)) =$

② $f(f(x)) =$

① $f(g(x)) = f(x^3-1)$

$= -(x^3-1)^2 + 3$

$= -(x^3-1)(x^3-1) + 3$

$= -(x^6 - x^3 - x^3 + 1) + 3$

$= -x^6 + x^3 + x^3 - 1 + 3$

$f(g(x)) = -x^6 + 2x^3 + 2$

② $f(f(x)) = f(-x^2+3)$

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

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

$= -(x^4 - 3x^2 - 3x^2 + 9) + 3$

$= -x^4 + 3x^2 + 3x^2 - 9 + 3$

$f(f(x)) = -x^4 + 6x^2 - 6$

Evaluate each composite function:

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

① $f(g(2)) =$

$g(f(-3)) =$

① $f(\underline{g(2)})$

$g(2) = -3(2) + 4$

$= -6 + 4$

$\boxed{g(2) = -2}$

$\rightarrow f(-2) = -(-2)^2 + 2(-2) - 3$

$= -4 - 4 - 3$

$f(-2) = -11$

$f(g(2)) = -11$

Evaluate each composite function:

$f(x) = -x^2 + 2x - 3 \qquad g(x) = -3x + 4$

$f(g(2)) =$

2 $g(f(-3)) =$

2 $g(f(-3))$

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

$= -9 - 6 - 3$

$f(-3) = -18$

$\rightarrow g(-18) = -3(-18) + 4$

$= 54 + 4$

$g(-18) = 58$

$g(f(-3)) = 58$

Inverse Functions:

- A function has an inverse if and only if it is a one-to-one function
- The domain of the inverse of the function is the range of the function, and the range of the inverse function is the domain of the function
- The symbol $f^{-1}(x)$ is used to denote the inverse of a function and is read "*f* inverse of *x*"

- If two functions are inverses of one another, then the following will hold true:

•$f(f^{-1}(x)) = x$ and •$f^{-1}(f(x)) = x$

$f(f^{-1}(2)) = 2$

$f^{-1}(f(-3)) = -3$

Finding the inverse of a function:

- rewrite the function in the form of $y = f(x)$
- switch the *x* and *y* and solve for *y*
- change the *y* to $f^{-1}(x)$

- if the function is given in ordered pair form, use the properties of domain and range

$f(x)$ $D \rightarrow R$ $f^{-1}(x)$

$R \rightarrow D$

Find the inverse function, if it exists: 1-1?

$f(x) = \{(-2,3),(4,-1),(5,2),(0,-3)\}$ 1-1 ✓

$f^{-1}(x) = \{(3,-2),(-1,4),(2,5),(-3,0)\}$

$f(x) = \{(-1,2),(9,3),(3,2),(4,5)\}$

not 1-1 → no $f^{-1}(x)$

Find the inverse function, if it exists:

$$f(x) = \frac{1}{2}x - 1 \qquad \text{1-1} \checkmark$$

$$x = \frac{1}{2}y - 1$$

$$\left[x + 1 = \frac{1}{2}y\right]2$$

$$2x + 2 = y$$

$$\boxed{f^{-1}(x) = 2x + 2}$$

Find the inverse function, if it exists:

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

The function is not 1-1 and will not have an inverse function.

Find the inverse function, if it exists:

$f(x) = 8x + 6$ 1-1 ✓

$x = 8y + 6$

$\frac{x-6}{8} = \frac{8y}{8}$

$\frac{1}{8}x - \frac{3}{4} = y$

$\boxed{f^{-1}(x) = \frac{1}{8}x - \frac{3}{4}}$

Assignment:

p.405 #28-64 (by 4)