

HW:

$$\textcircled{3} \quad \downarrow$$

$$\textcircled{1} \quad -6x - 2y + 2z = -8$$

$$\textcircled{2} \quad 2(3x - 2y - 4z = 8)$$

$$\textcircled{3} \quad 6x - 2y - 6z = -18$$

\textcircled{1} and \textcircled{3}

$$\cancel{-4y - 4z = -26} \quad \frac{\cancel{-4y}}{2} = \frac{\cancel{-26}}{2}$$

$$\begin{cases} 3(2y + 2z = 13) \\ 2(3y - 3z = 4) \end{cases}$$

$$\begin{array}{l} \textcircled{1} \text{ and } \textcircled{2} \\ -6x - 2y + 2z = -8 \\ 6x - 4y - 8z = 16 \\ \hline -6y - 6z = 8 \\ \frac{-6y}{2} - \frac{6z}{2} = \frac{8}{2} \\ -3y - 3z = 4 \end{array}$$

$$\begin{array}{r} 6y + 6z = 39 \\ -6y - 6z = 8 \\ \hline 0 \neq 47 \end{array}$$

$$① 3(x - y + 4z) = 5$$

$$② 4x + 3y - 2z = 5$$

$$2x + z = 2$$

$$3x - 3y + 12z = 15$$

$$4x + 3y - 2z = 5$$

$$\underline{7x + 10z = 20}$$

$$z = (-2x + 2)$$

$$z = 2$$

$$7x + 10(-2x + 2) = 20$$

$$-13x = 0$$

$$x = 0$$

Function Operations & Compositions

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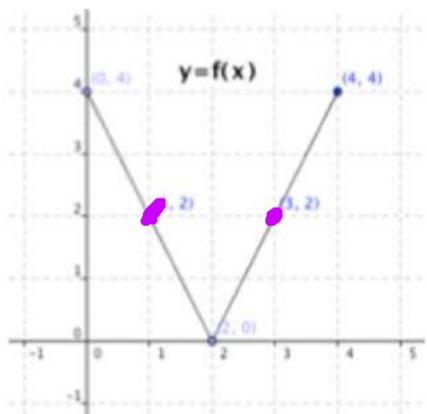


**"It's important to learn math because
someday you might accidentally buy
a phone without a calculator."**

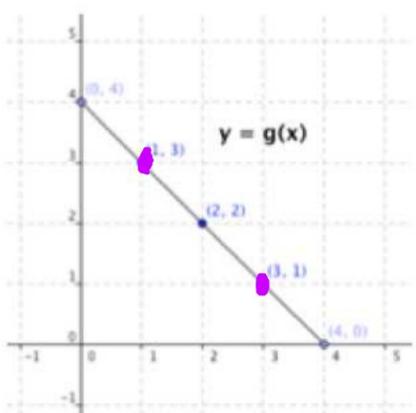
Function Operations

Addition	$f(x) + g(x) = (f + g)(x)$
Subtraction	$f(x) - g(x) = (f - g)(x)$
Multiplication	$f(x)g(x) = (fg)(x)$
Division	$\frac{f(x)}{g(x)} = \left(\frac{f}{g}\right)(x)$

ex: Evaluate.



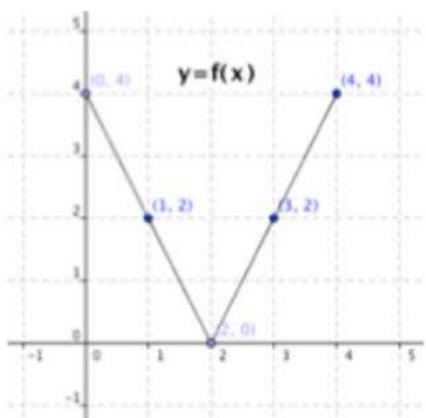
a) $(f + g)(3)$
 $f(3) + g(3)$
 $2 + 1 = 3$



b) $(f - g)(1)$
 $f(1) - g(1)$
 $2 - 3 = -1$

c) $(fg)(4)$
 $4 \cdot 0 = 0$

ex: Evaluate.



d) ~~$(fg)(0)$~~ $\left(\frac{g}{f}\right)(1) \frac{3}{2}$

e) ~~$\left(\frac{g}{f}\right)(1)$~~ $\left(\frac{f}{g}\right)(1) \frac{2}{3}$

f) $\left(\frac{f}{g}\right)(3) \frac{2}{1} = 2$

g) ~~$-5(fg)(2)$~~ = 0

ex: Evaluate each expression given the functions below.

$$f(x) = x^{2/3} \quad g(x) = \sqrt[4]{x} \quad h(x) = x + 5$$

a) $(f+h)(27)$

e/i

$$27^{2/3} + (27+5) = 9 + 32 = 41$$

b) $(fg)(1) = | \cdot | = |$

c) $\left(\frac{h}{f}\right)(64) = \frac{h(64)}{f(64)} = \frac{64}{64^{2/3}} = \frac{64}{16}$
$$\left(\sqrt[3]{64}\right)^2$$

Function Compositions

$$(f \circ g)(x) = f(g(x))$$

$$(g \circ f)(x) = g(f(x))$$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition, if possible.

a) $(f \circ g)(1) = |$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition, if possible.

b) $(n \circ m)(0) = 5$

ex: Let

$$f(x) = \sqrt{x} \quad m(x) = x^2 \quad \frac{1}{32} = 32$$

$$g(x) = \sqrt[5]{x} \quad n(x) = x + 5 \quad \frac{1}{32}$$

$$h(x) = \frac{1}{x} \quad p(x) = x^2 - 10x + 25$$

Find the composition, if possible.

$$(f \circ h)\left(\frac{1}{32}\right) = f\left(h\left(\frac{1}{32}\right)\right) = f(32)$$
$$= \sqrt{32} = 4\sqrt{2}$$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition, if possible.

d) $(f \circ n)(-6)$

$\sqrt{-1}$ nonreal

ex: Let

$$\begin{array}{lll} f(x) = \sqrt{x} & m(x) = x^2 & \frac{1}{2} = 2 \\ g(x) = \sqrt[5]{x} & n(x) = x + 5 & \\ h(x) = \frac{1}{x} & p(x) = x^2 - 10x + 25 & \end{array}$$

Find the composition, if possible.

e.) ~~$(p \circ h)(0)$~~ $(h \circ f)(4) = \frac{1}{2}$

f.) $(n \circ n)(3) = 13$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition.

a) $(f \circ n)(x) = \sqrt{x+5}$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition.

b) $(h \circ p)(x) = \frac{1}{\cancel{x^2 - 10x + 25}}$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition.

☆ $\circ (f \circ m)(x) = \sqrt{x^2} = |x|$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = (x)^2 - 10(x) + 25$$

Find the composition.

$$\begin{aligned} d) (p \circ n)(x) &= (x+5)^2 - 10(x+5) + 25 \\ &= x^2 + 10x + 25 - 10x - 50 + 25 \\ &= x^2 \end{aligned}$$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition.

e) $(n \circ h)(x) = \frac{1}{x} + 5$

f) $(f \circ g)(x)$

g) $(m \circ f)(x)$

ex: Let

$$f(x) = \sqrt{x}$$

$$g(x) = \sqrt[5]{x}$$

$$h(x) = \frac{1}{x}$$

$$m(x) = x^2$$

$$n(x) = x + 5$$

$$p(x) = x^2 - 10x + 25$$

Find the composition.

$$f(m(g(h))) \quad p(m(x)) = x^4 - 10x^2 + 25$$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

$$p(x) = x^2 - 10x + 25$$

Find the composition.

~~g)~~
$$(m \circ f)(x) \quad (\sqrt{x})^2 = x$$

ex: Let

$$f(x) = \sqrt{x}$$

$$m(x) = x^2$$

$$g(x) = \sqrt[5]{x}$$

$$n(x) = x + 5$$

$$h(x) = \frac{1}{x}$$

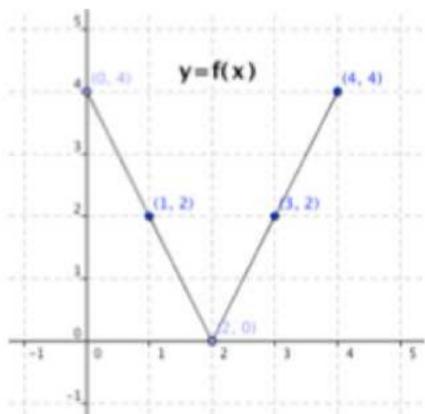
$$p(x) = x^2 - 10x + 25$$

Find the composition.

~~g) $(m \circ f)(x)$~~ h.)

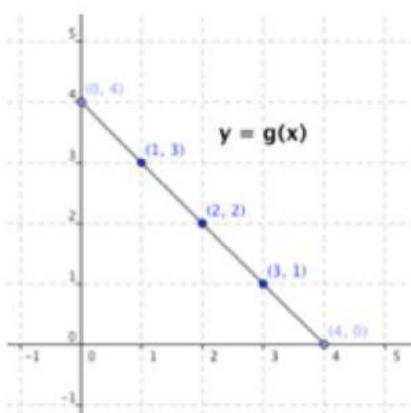
$$(h \circ h)(x) = \frac{1}{\frac{1}{x}} = x$$

ex: Evaluate.



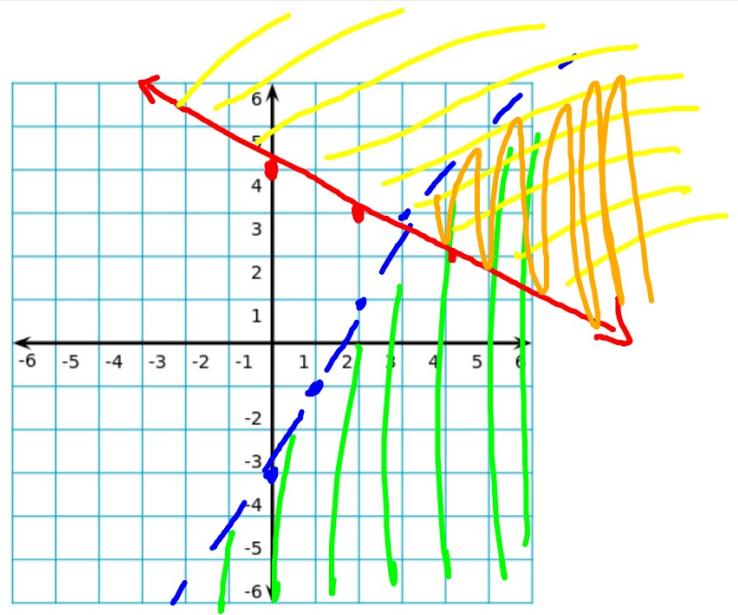
a) $(f \circ g)(2) = f(2) = 0$ 2

b) $(g \circ f)(3) = g(3) = 2$ 2

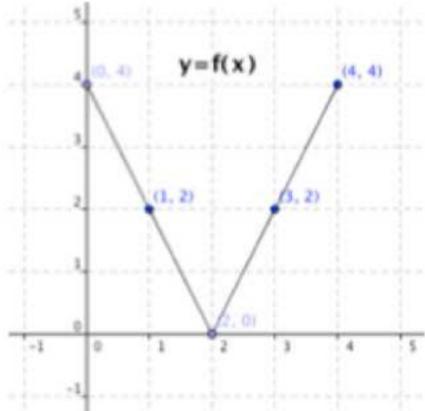


c) $(f \circ f)(1) = f(f(1)) = f(2) = 0$ 0

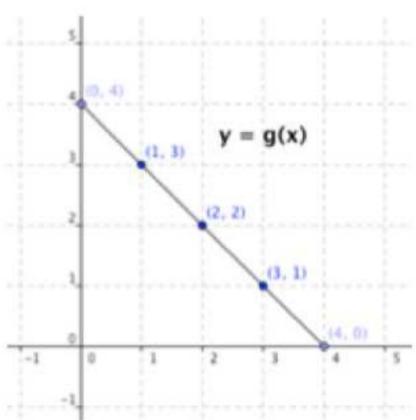
$$y < 2x - 3$$
$$y \geq -\frac{1}{2}x + 4$$



3.3 Notes - WKST



d) $(g \circ g)(3)$ 3



e) $(f \circ (g \circ f))(1)$ 0

REVIEW

If $f(x) = x^2 + 2x + 1$ and $g(x) = 3(x+1)^2$,
which is an equivalent form of $f(x) + g(x)$?

- A $x^2 + 4x + 2$
- B $4x^2 + 2x + 4$
- C $4x^2 + 8x + 4$
- D $10x^2 + 20x + 10$

REVIEW

Which expression represents $f(g(x))$ if $f(x) = x^2 - 1$ and $g(x) = x + 3$?

- A** $x^3 + 3x^2 - x - 3$
- B** $x^2 + 6x + 8$
- C** $x^2 + x + 2$
- D** $x^2 + 8$

REVIEW

ex: Simplify.

$$\sqrt[4]{48xy^{12}z^9}$$

REVIEW

ex: Simplify.

$$-64^{5/6}$$

REVIEW

Which is a simplified form of $\frac{3a^2b^3c^{-2}}{(a^{-1}b^2c)^3}$?

A $\frac{3a^5}{b^3c^5}$

B $\frac{3ab}{c^5}$

C $\frac{3}{b^2c^5}$

D $\frac{3}{ab^3c^5}$