

Good Morning Happy Monday!

Agenda:

- Warm UP

- Practice with compositions

- Quiz next period on Inverses and Compositions

Warm UP:

1) The inverse of $f(x)$ is $3x+2$, what is $f(x)$?

2) Find the inverse set if the set $\{(3,2) (-1,-4) (9,-10) (-3, 2)\}$ are the points on the function $g(x)$.

$D: \{3, -1, 9, -3\}$

3) $F(x)$ has domain of $[3, 10)$ and range of $[-12, 20)$, what is the domain and range of the inverse?



Continue Compositions:

$$f(x) = 2x - 7$$

$$g(x) = x + 7$$

"f of 3"

$$a) f(3) = 2(3) - 7 = -1$$

"g of 2"

$$g(2) = 2 + 7 = 9$$

$$b) f(g(1)) \quad g(1) = 1 + 7 = 8$$

$$g(f(1))$$

"f of g of 1" $f(g(1)) = f(8)$

$$c) f(f(0)) \quad f(8) - 7 = 9$$

$$g(g(-3))$$



Are f and g inverses?
To answer we must test

$$f(x) = 2x - 7$$

$$g(x) = x + 7$$

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

$$\text{and } g(f(x)) = x$$

$$2(x+7) - 7$$

$$g(2x-7)$$

$$(2x-7) + 7$$

$$2x + 14 - 7$$

$$\boxed{2x + 7}$$

$$\boxed{2x}$$

$$f(x) = 2x - 8$$

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

$$h(x) = \frac{1}{2}x + 4$$

a) $g(f(4))$

c) $g(f^{-1}(2))$

b) $h(g(f(0)))$

d) $h(g(h(f(1))))$

$$f^{-1}(x) = \frac{x+8}{2} = \frac{x}{2} + 4$$

$$= \frac{2+8}{2} = 5$$

$$g(5) \\ (5+3)^2 = 8^2 = 64$$

$$y = 6x$$
$$f(x) = 6x$$

$$x = 6y$$

$$\underline{\underline{f^{-1}(x) = \frac{x}{6}}}$$

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

Verify

$$\underline{\underline{f(f^{-1}(x))}}$$

$$f\left(\frac{x}{6}\right) = 6\left(\frac{x}{6}\right) = x \quad \checkmark$$

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

$$f^{-1}(6x)$$

$$\frac{6x}{6} = \boxed{x} \quad \checkmark$$

$$y = 3x + 1 \rightarrow$$

$$x = 3y + 1$$

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

$$\cancel{3} \left(\frac{x-1}{\cancel{3}} \right) + 1$$
$$x-1+1 = \boxed{x} \checkmark$$

$$\frac{(3x+1)-1}{3} = \frac{3x}{3} = \cancel{x}$$

$$\textcircled{11} \quad y = \sqrt[3]{x}$$

$$x^3 = (\sqrt[3]{y})^3$$

$$\boxed{y = x^3}$$

$$\sqrt[3]{x^3} = x$$

$$(\sqrt[3]{x})^3 = x$$

$$\textcircled{12} \quad y = x^5$$

$$x = y^5 = \sqrt[5]{x}$$

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

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

(13)

$$f(x) = -\frac{7}{2}x - 3 \quad g(x) = -\frac{2x+6}{7}$$

$f(g(x))$

$$\cancel{\frac{-7}{2}} \left(\overset{1}{-} \left(\overset{3}{\frac{2x+6}{7}} \right) \right) - 3 = -(-x+3) - 3$$

$x+3-3 = \textcircled{x}$

$$g(f(x)) = -\left(\frac{2\left(-\frac{7}{2}x - 3\right) + 6}{7} \right)$$

$$= \frac{(-7x - 6) + 6}{7}$$

$$= \left(\frac{-7x - 6 + 6}{7} \right)$$

$$= \left(\frac{-\cancel{7}x}{\cancel{7}} \right) = -(-x)$$

\textcircled{x}

HW

3, 4, 5