Honors Pre-Calculus Chapter 1.5.-1.8 Worksheet

Do work on your own paper.

1. Identify the transformations applied to $f(x)$.

a) $f(x+3)-7$

left 3
down 7

b) $-3f(x)+2$

Reflected x axis
Stretch by factor of 3
up 2

c) $-\frac{1}{2}f(-x+4)-6$

Reflected x + y axis
Stretched by factor of $\frac{1}{2}$.
Right 4, down 6

2. Find $f \circ g$ and $g \circ f$ and their domains.

a) $f(x)=2x-8$, $g(x)=\frac{x}{x+6}$

$(f \circ g)(x)$
$\frac{-6x-6}{x+6}$
$D(-\infty,6)(6,\infty)$

$(g \circ f)(x)$
$\frac{(x-4)}{x-1}$
$D(-\infty,1)(1,\infty)$

b) $f(x)=\sqrt{x-7}$, $g(x)=x^2+7$

$(f \circ g)(x)$
x
$D(-\infty,\infty)$

$(g \circ f)(x)$
x
$D\ [7,\infty)$

3. Use the graphs on p. 169 of your book to evaluate the following.

a) $(f+g)(1)$
$f(1)+g(1)$
$2+3$
5

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

c) $(f \circ g)(4)$
$f(g(4))$
$f(0)$
2

d) $(f \circ f)3$
$f(f(3))$
$f(2)$
0

4. Find function f and g such that $(f \circ g)(x)=h(x)$

a) $h(x)=\frac{5x+15}{x+5}$

$h(x)=\frac{5(x+3)}{x+5}$
$f(x)=\frac{5(x-2)}{x}$
$g(x)=x+5$

b) $h(x)=\left(\sqrt[3]{4x-5}\right)^5$

$f(x)=\left(\sqrt[3]{x}\right)^5$
$g(x)=4x-5$

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

$h(x)=\frac{(x+2)(x-2)}{x+1}$
$f(x)=\frac{(x+1)(x-3)}{x}$
$g(x)=x+1$

5. Given $f(x)=2x+1$ and $g(x)=x-3$, find the following.

a) $(f \circ g)^{-1}$

$(f \circ g)=2(x-3)+1$
$(f \circ g)=2x-5$
$(f \circ g)^{-1}=\frac{x+5}{2}$

b) $(g^{-1} \circ f^{-1})$

$g^{-1}(x)=x+3$
$f^{-1}(x)=\frac{x-1}{2}$
$(g^{-1} \circ f^{-1})=\frac{x+5}{2}$

c) $(f^{-1} \circ f^{-1})$

$=\frac{x-3}{4}$
$(f^{-1} \circ f^{-1})=\frac{\left(\frac{x-1}{2}\right)-1}{2}$
$\frac{\left(\frac{x-1}{2}\right)-\frac{2}{2}}{\frac{2}{1}}=\frac{\frac{x-3}{2}}{\frac{2}{1}}\cdot\frac{\frac{1}{2}}{\frac{1}{2}}=$

6. Determine if the following are 1 to 1 functions, if it is find its inverse. If it isn't create a domain restriction that will make it a 1 to 1 function and find the inverse of the new function.

a) $f(x) = \dfrac{2x-7}{5x+1}$

$x = \dfrac{2y-7}{5y+1}$

$5xy + x = 2y - 7$

$5xy - 2y = -x - 7$

$y(5x-2) = -x - 7$

$f^{-1}(x) = \dfrac{-x-7}{5x-2}$

b) $f(x) = -(x-2)^2 + 1$

$D = (-\infty, 1]$

$R = (-\infty, 0]$

One possible solution

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

$x - 1 = -(y-2)^2$

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

$\pm\sqrt{-x+1} = y - 2$

$-\sqrt{-x+1} + 2 = y$

$D = (-\infty, 0]$

$R = (-\infty, 1]$

c) $f(x) = \sqrt{x+5} - 1$

$x = \sqrt{y+5} - 1$

$(x+1) = \sqrt{y+5}$

$(x+1)^2 = y + 5$

$(x+1)^2 - 5 = y$

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

$D\ [1, \infty)$

7. Suzy found that the demand for her self-serve frozen yogurt varies inversely as the price of the yogurt. She sells 1,200 oz/day when the price is 33¢/oz. Write a model that relates the demand and cost. What would the demand be if she raised her price to 35¢/oz?

$d = \dfrac{k}{p}$

1200 oz/day

33¢ /oz

$1200 = \dfrac{k}{.33}$

$396 = k$

$d = \dfrac{396}{p}$] model

$d = \dfrac{396}{.35}$

$d = 1{,}131$

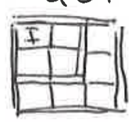
8. The illumination from a light source varies inversely as the square of the distance from the light source. When the distance from the light source is tripled, how does the illumination change?

d = tripled

$I = \dfrac{k}{d^2}$

$I = \dfrac{k}{(3d)^2} \Rightarrow I = \dfrac{k}{9d^2} \Rightarrow I = \dfrac{1}{9}\left(\dfrac{k}{d^2}\right)$

It is $\frac{1}{9}$ of what it used to be.



9. Write a function (including any domain restrictions) for the vertical distance, d, from $f(x) = 2\sqrt{x}$ down to $g(x) = \dfrac{1}{2}x$.

$d(x) = 2\sqrt{x} - \frac{1}{2}x$

$D[0, 16]$