Homework 1.6

Given below is the graph of a function, $f(x)$, a table of values of a discrete function, $g(x)$, and an equation of a function, $h(x)$. In questions 1 – 4, there are two quantities that you are to consider, Quantity A and Quantity B. Find the values of both quantities. Then, after comparing them, place a <, >, or = in the box between the described quantities. If no comparison can be made, simply write N.C. in the box.

Graph of $f(x)$

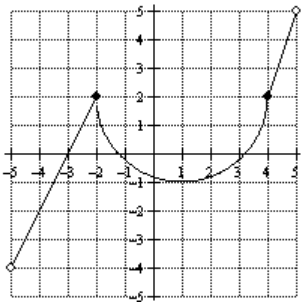

Table of Values for $g(x)$

−4	−5
−3	−2
−1	0
2	4
4	5
6	−2

Equation for $h(x)$

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

SHOW OR EXPLAIN YOUR WORK!

	Quantity A	<, >, =, or N.C.	Quantity B
1.	$-2f(4)+3h(5)$ $h(5)=\sqrt{5+4}+2$ $=\sqrt{9}+2$ $=3+2$ $=5$ $=-2(2)+3(5)$ $=-4+15$ $=11$	NC	$f(g(-4))$ is undefined $g(-4)=-5$ $f(-5)$ is undefined
2.	$h(5)-2\cdot g(6)$ $=5-2(-2)$ $=5+4$ $=9$	=	$h(g(4))+2\cdot f(-2)$ $g(4)=5$ $h(5)=5$ $=5+2(2)$ $=5+4$ $=9$
3.	$f(g(h(0)))$ is undefined $h(0)=\sqrt{0+4}+2$ $=\sqrt{4}+2$ $=2+2$ $=4$ $g(4)=5$ $f(5)$ is undefined	NC	$h(g(-1))=4$ $g(-1)=0$ $h(0)=4$
4.	The number of x – values for which $h(x)=f(x)$ $h(x)$ and $f(x)$ have ☹ x-values where their graphs intersect	<	The number of x – values for which $p(x)=g(h(12))$ if $p(x)=-2\lvert x+3\rvert$ $-2\lvert x+3\rvert=g(6)$ $-2\lvert x+3\rvert=-2$ $\lvert x+3\rvert=1$ $x+3=\pm 1$ $x=-3\pm 1$ $x=-4,-2$ ∴ 2 values

For questions 5 – 10, use the functions below to find an equation for the indicated composite functions.

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

5. $2x \cdot h(x) - f(x) =$ $2x \cdot (2x-1) - (x^2 - 3x + 2)$

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

$= 3x^2 + x - 2$

6. $(g + h)(x) =$ $\dfrac{2x+3}{x-2} + \dfrac{(2x-1)\cdot(x-2)}{x-2}$

$= \dfrac{2x+3}{x-2} + \dfrac{2x^2 - x - 4x + 2}{x-2}$

$= \dfrac{2x^2 - 3x + 5}{x-2}$

7. $g(h(x)) =$ $g(2x-1)$

$= \dfrac{2(2x-1)+3}{(2x-1)-2}$

$= \dfrac{4x-2+3}{2x-3}$

$= \dfrac{4x+1}{2x-3}$

8. $f(h(x)) =$ $f(2x-1)$

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

$= 4x^2 - 4x + 1 - 6x + 3 + 2$

$= 4x^2 - 10x + 6$

9. $(f \cdot h)(x) =$ $f(x) \cdot h(x)$

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

$= 2x^3 - 6x^2 + 4x - x^2 + 3x - 2$

$= 2x^3 - 7x^2 + 7x - 2$

10. $\dfrac{f(x+h) - f(x)}{h} = \dfrac{[(x+h)^2 - 3(x+h) + 2] - [x^2 - 3x + 2]}{h}$

$= \dfrac{x^2 + 2hx + h^2 - 3x - 3h + 2 - x^2 + 3x - 2}{h}$

$= \dfrac{2hx + h^2 - 3h}{h}$

$= \dfrac{h(2x + h - 3)}{h}$

$= 2x + h - 3$