Notes Operations on Functions

A. <u>Combinations of functions:</u> Given 2 functions $f(x)$ and $g(x)$ we can determine:

1.	Sum:	$(f+g)(x) = f(x) + g(x)$	add the functions together
2.	Difference:	$(f-g)(x) = f(x) - g(x)$	subtract the functions (distribute the minus sign)
3.	Product:	$(f \cdot g)(x) = f(x) \cdot g(x)$	multiply the functions
4.	Quotient:	$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$	divide the functions

- The ***domain*** of the new "combined" functions will be the intersection of the domains of $f(x)$ and $g(x)$, excluding any new "issues" that may arise.
  - First, find the domains of $f(x)$ and $g(x)$, then find the intersection of those domains.
  - The domain of the new "combined" function will be this intersection minus new "issues"

Find $(f+g)(x)$, $(f-g)(x)$, $(f \cdot g)(x)$, and $\left(\frac{f}{g}\right)(x)$ and their respective domains given

EX1: $f(x) = x - 7$ and $g(x) = x^2 + 2$

EX1a: $(f+g)(x)$	EX1b: $(f-g)(x)$
EX1c: $(f \cdot g)(x)$	EX1d: $\left(\dfrac{f}{g}\right)(x)$

EX2: $f(x) = \dfrac{3}{x-4}$ and $g(x) = \dfrac{1}{x+5}$

EX2a: $(f+g)(x)$	EX2b: $(f-g)(x)$
EX2c: $(f \cdot g)(x)$	EX2d: $\left(\dfrac{f}{g}\right)(x)$

B. Composition of functions: Given 2 functions $f(x)$ and $g(x)$ we can determine:

i. $(f \circ g)(x) = f(g(x))$ which means to replace all the x's in f(x) with the expression g(x) is equal to.

ii. $(g \circ f)(x) = g(f(x))$ which means to replace all the x's in g(x) with the expression f(x) is equal to.

Use the given functions to find $(f \circ g)(x)$ and $(g \circ f)(x)$

Ex3: $f(x) = x - 7$ and $g(x) = x^2 + 2$ $(f \circ g)(x) =$	Ex4: $f(x) = x^2 + 2$ and $g(x) = \sqrt{x-4}$ $(f \circ g)(x) =$
Ex5: $f(x) = x - 7$ and $g(x) = x^2 + 2$ $(g \circ f)(x) =$	Ex6: $f(x) = x^2 + 2$ and $g(x) = \sqrt{x-4}$ $(g \circ f)(x) =$