PreCalc 12 Final Review Chp 4

4.1) Combining Functions.
- use the most restrictive domain (smallest interval)
- use key points to graph, if not enough k.p. then use a table of values.
- different key points for add, sub, mult, div. Look in notes, but easy to reason out.

4.2) Alternative, algebraically combine them, then use a table of values. Make sure you use brackets when subtracting/dividing/multiplying functions. Always use brackets when substituting to evaluate.

Find combining functions:
- find easy, but not trivial ones such as $f(x)=c$.
- for multiply, you should factor
- for divide, be careful about domains: ie. NPV's.

eg) divide by $g(x)$: if $g(x)=x^2-4$, NPV's
$g(x)=x^2+4$, no NPV's.

4.3) Compositions: Generally: $f(g(x)) \neq g(f(x))$
Another way to determine if functions are inverses of each other: $f(g(x))=x$
Always use brackets when substituting.

4.4) There are different ways to find compositing fns. but questions should be answered by "completing the square".

eg) $\sqrt{x^2+6x+20}$

$= \sqrt{(x^2+6x+9)-9+20}$

$= \sqrt{(x+3)^2+11}$

$k(x)=x+3$
$j(x)=x^2$
$h(x)=x+11$
$g(x)=\sqrt{x}$

The other way is to look for patterns of x.

eg) $(2x-3)^2+4(2x-3)+3$

$g(x) = 2x-3$
$f(x) = x^2+4x+3$

Determining Domain of Compositing Fns.

- difficult.
- working outwards, domains only get smaller, never larger.
- range of inner becomes domain of outer.
- More reliable way: expand composition, then determine the domain.

eg) Determine the domain of $f(g(h(x)))$ when

$f(x)=\sqrt{x-8}$ $\quad g(x)=x^2+4$ $\quad h(x)=x-3$

$$f(g(h(x))) = \sqrt{(x-3)^2+4-8}$$
$$= \sqrt{(x-3)^2-4}$$

$(x-3)^2-4 \geq 0$

$(x-3)^2 \geq 4$

$|x-3| \geq 2$

$x-3 \geq 2$

$x \geq 5$

$-(x-3) \geq 2$

$-x+3 \geq 2$

$-x \geq -1$

$x \leq 1$