## LESSON PLAN

Course: Grade 12 U Advanced Functions
Lesson: 2-2
Unit/Chapter: Functions
Topic: Functions Types
\# homework check: $\underline{\text { ASM12 p. } 22 \text { exercise } 1.1}$
p. 25 exercise 1.2

## - note: Function Types

As grade 12 students, you should be familiar with these different types of functions - their basic shape and equation:

1. linear functions of the form $y=m x+b$ (draw line)
2. quadratic functions of the form $y=A x^{2}+B x+C$ or $y=a(x-g)^{2}+h$ (draw parabola)
3. rational functions of the form $y=\frac{a}{(x-g)}+h$ (draw basic rational)
4. cubic functions of the form $y=a(x-g)^{3}+h$ (draw basic cubic)
5. absolute value functions of the form $y=a|x-g|+h$ (draw basic absolute)
6. radical functions of the form $y=a \sqrt{x-g}+h$ (draw basic rational)

Recall the purpose of each letter in the equation. The "a" defines a vertical stretch or compression, the " $g$ " defines a horizontal translation to the left or right, and the " H " defines a vertical translation up or down. These transformations help to define the domain or range of the function as well as their graph positions. For example,
a) $y=2 x^{2}-8 x+6 *$ we cannot graph this function in this form, so we complete the square
$y=2\left(x^{2}-4 x+4\right)-8+6$
$y=2(x-2)^{2}-2$
$" a "=2$, vertical stretch by a factor of 2

b) $y=\frac{1}{x-3}+1$
$" \mathrm{a} "=1$, no vertical change
$" \mathrm{~g} "=-3$. horizontal translation to the right by 3 units
" $\mathrm{h} "=1$, vertical translation up by 1 unit

c) $y=-2|x+2|-5 \quad$ "a" $=-2$. vertical reflection and vertical stretch by 2
$" \mathrm{~g} "=2$. horizontal translation left 2 units
" $h$ " $=-5$. vertical translation down 5 units


- homework assignment: FM12 p. 193 exercise 6.5 \#4, 5(odds), $6-8$


## EXERCISE 6.5

4. Use transformations to graph the following functions starting from the graph of $y=x^{2}$.
(a) $y=3 x^{2}-1$
(b) $y=-2 x^{2}$
(c) $y=-\frac{1}{2}(x-3)^{2}$
(d) $y=-2(x+3)^{2}+4$
5. Complete the square and use transformations to graph the following
(d) $y=x^{2}-5 x-5$
(e) $y=-x^{2}+8 x-12$ functions.
(f) $y=3 x-x^{2}$
(a) $y=x^{2}+2 x+2$
(g) $y=2 x^{2}+8 x-3$
(b) $y=x^{2}-6 x$
(h) $y=3 x^{2}-6 x+1$
(c) $y=x^{2}-x+3$
(i) $y=x^{2}+x+1$
(j) $y=-2 x^{2}-16 x+5$
6. Use transformations to graph the following -functions starting from the graph of $y=x^{3}$.
(a) $y=-x^{3}$
(a) $y=|x-4|$
(b) $y=x^{3}-1$
(b) $y=-|x|+1$
(c) $y=\frac{1}{3} x^{3}$
(c) $y=\frac{1}{2}|x+2|$
(d) $y=(x+5)^{3}$
(d) $y=|x-3|-5$
7. Use transformations to graph the following
functions starting from the graph of $y=\frac{1}{x}$.
(a) $y=\frac{1}{x-1}$
(b) $y=\frac{1}{x}-1$
(c) $y=\frac{2}{x}+3$
(d) $y=-\frac{1}{x+2}$
