1.4 Shifting, Reflecting, and Stretching Graphs
Day 1 and 2

I. **Common Functions**...see page 42 a through f

II. **Rigid Transformations**--Basic shape of graph is kept.
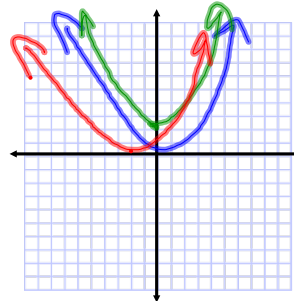
Let us explore...graph $y = x^2$

$$y = x^2 - 1$$
$$y = x^2 + 3$$
$$y = (x - 2)^2$$
$$y = (x + 4)^2$$

A) **Vertical and Horizontal shifts of f(x)**.
  1.

  ~~Page 43~~

  2.

  3.

  4.

Ex 1) Sketch the 3 graphs on the same axes.
$f(x) = x^2$ $g(x) = x^2 + 2$ $h(x) = (x + 2)^2$

B) Reflections of f(x).
1. Reflection in the x-axis: $h(x) = -f(x)$
2. Reflection in the y-axis: $h(x) = f(-x)$

Ex 2) Graph $y = -\sqrt{x}$ $y = \sqrt{-x}$ $y = -\sqrt{x + 2}$

reflection over x-axis / *reflection over y-axis* \ *reflection over x-axis 2 units left*

Ex 3) Graph $y = x^4$. Write equations based on what I show you on the graphing calculator.

III. **Nonrigid Transformations**--graph is distorted/changed.
A. Vertical Stretch:
   Vertical Shrink: **See other slide**

B. Horizontal Stretch:
   Horizontal Shrink:

Ex 4) Describe the transformations if $g(x) = |x|$
$h(x) = 3|x|$

$r(x) = .2|x|$ **See next slide**

$f(x) = |3x|$

$u(x) = |(1/7)x|$

Ex 4) Describe the transformations if g(x) = √x

h(x) = 3 √x

r(x) = .2 √x

f(x) = √3x

u(x) = √(1/7)x

Ex 5) Compare the graph of the function with $f(x) = \sqrt{x}$.

A) $y = 2\sqrt{x} - 3$

B) $y = -\sqrt{(5x)} + 4$

Ex 6) Compare the graph of the function with $f(x) = x^3$.

A. $g(x) = -(x - 1)^3$

B. $p(x) = -5(x + 2)^3 - 8$