DO NOW

Revisit graphs on page 22.
Are you familiar with all 8 of these basic graphs?

1.3 Functions and Their Graphs - Day 2

Basic Types of Transformations ($c > 0$)

Original graph: $y = f(x)$

Horizontal shift c units to the right: $y = f(x-c)$

Horizontal shift c units to the left: $y = f(x+c)$

Vertical shift c units down: $y = f(x) - c$

Vertical shift c units up: $y = f(x) + c$

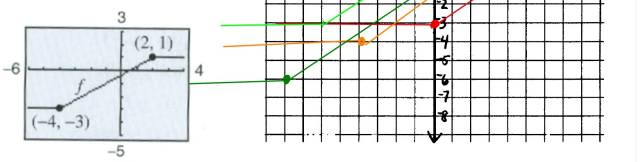
Reflection (about the x-axis): $y = -f(x)$

Reflection (about the y-axis): $y = f(-x)$

Reflection (about the origin): $y = -f(-x)$

Examples: pg 28; 56

(a) f(x − 4)
(b) f(x + 2)
(c) f(x) + 4
(d) f(x) − 1
(e) 2f(x)
(f) ½f(x)



Classification & Combination of functions

Three categories of elementary functions:

1. Algebraic – polynomial, radical, rational
2. trigonometric – sine, cosine, tangent etc.
3. exponential & logarithmic

Polynomial Functions:

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots a_2 x^2 + a_1 x^1 + a_0 x^0$$

Recall:

Constant function - zero degree $f(x) = a$

Linear function - 1st degree $f(x) = ax + b$

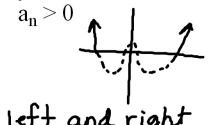
Quadratic function - 2nd degree $f(x) = ax^2 + bx + c$

Cubic function - 3rd degree $f(x) = ax^3 + bx^2 + cx + d$

Leading Coefficient Test - determines left & right behavior of polynomial graph (not center)

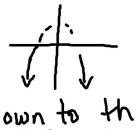
Polynomials with **EVEN** degree

$a_n > 0$



left and right go up...

$a_n < 0$



down to the left and right

Polynomials with **ODD** degree

$a_n > 0$

down to left up to right

$a_n < 0$

up left and down right

Rational Functions - Quotient of 2 polynomials

Ex: $f(x) = \frac{P(x)}{q(x)}$ $\quad q(x) \neq 0$

Composite Functions - Let f & g be functions

$f \circ g(x) = f(g(x))$

Note $f \circ g$ is not generally equal to $g \circ f$

Zeros of a function - x-intercepts of a function where $f(x)=0$

Even function - symmetric to y-axis

$f(-x) = f(x)$

Odd function - symmetric to origin

$f(-x) = -f(x)$

HOMEWORK

pg 28 - 29; 49 - 55, 59, 60, 61, 63, 69, 71, 75, 76