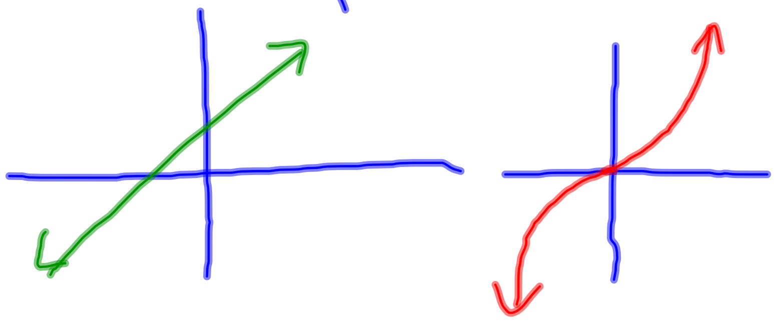
<u>One-to-One Function</u> -- each x is paired with exactly one y, and each y is paired with exactly one x

ex: → pass vert & Horiz. line test



$y = x + 1$

$y = x^3$

Transformations on $f(x)$		ex: $f(x) = x^2$
-- Horizontal Shift Right:	$f(x - c)$	$(x - 3)^2$
-- Horizontal Shift Left:	$f(x + c)$	$(x + 4)^2$
-- Vertical Shift Up:	$f(x) + c$	$x^2 + 7$
-- Vertical Shift Down:	$f(x) - c$	$x^2 - 2$
-- Reflect across x-axis:	$- f(x)$	$- x^2$
-- Reflect across y-axis:	$f(-x)$	$(-x)^2$
-- Reflect through origin:	$- f(-x)$	$-(-x)^2$

ex1: $f(x) = \sin x$

$g(x) = 5 + \sin(x + 1)$

V. up 5

H. Left 1

$h(x) = -\sin(x - 2)$

Reflect x

H. Rt 2

ex2: $f(x) = x^3$

reflect across x-axis, shift left 3, then shift down 7

$-(x+3)^3 - 7$

Elementary Functions

1) Algebraic Functions

--polynomials $(x^3 - 5x^2 + 2x - 7)$

--radical $(\sqrt{7 - 5x})$

--rational $\left(\dfrac{x + 3}{6x^2}\right)$

2) Trigonometric Functions

--sin(x), cos(x), tan(x), etc...

3) Exponential & Logarithmic Functions

-- e^x, ln(x)

Polynomials: $y = a_n x^n + a_{n-1}x^{n-1} + ... + a_1 x + a_0$

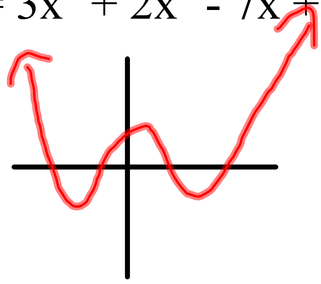
*Degree -- determines the potential # of roots

*Leading Coefficient -- determines end behavior of the graph

-- if $a_n > 0$, the graph goes up to the right

-- if $a_n < 0$, the graph goes down to the right

ex) $y = 3x^4 + 2x^3 - 7x + 3$



Composite Functions

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

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

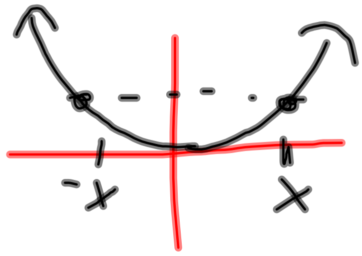
1) $f(x) = x^2 - 3x + 4$, $g(x) = x + 1$

$f \circ g(x) =$ $g(f(-2)) =$ 15

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

$x^2 + 2x + 1 - 3x - 3 + 4$

$x^2 - x + 2$



Even Functions -- y-axis symmetry

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

-- degree of x is even

ex: $f(x) = x^2$

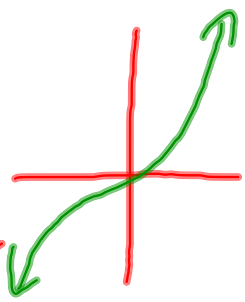
$h(x) = x^6 + 3x^4 + 2x^2 + 7$

Odd Functions -- origin symmetry

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

-- degree of x is odd

ex: $f(x) = x^3 + 3x^5 + 7x$



HW: p28, # 26, 33, 36-38, 40-44e, 48, 52, 59