1.2

y-intercepts: where the graph crosses the y-axis and x = 0

x-intercepts: where the graph crosses the x-axis and y = 0

Function: when each domain value is paired with on one range value (no repeating x's)

- graphically: passes the vertical line test

Domain & Range (card)

Domain: x-values - input
read x's from left to rt. (smallest to largest)

*some functions have domain restrictions - can't divide by zero
to find: set the den. = 0 and solve for x. These are the restrictions.

can't have a neg. # in a sq. root
to find: set the radicand ≥ 0 and solve for x.

Range: y-values - output
read y's from bottom to top (smallest to largest)

Domain Restrictions:

1. Exclude any value that makes the denominator = 0

2. Exclude values that lead to the √ of a negative number

3. Taking the Log of a negative number

Asymptotes:

vertical (VA): caused by dividing by 0

the graph approaches $-\infty$ *or* ∞

on each side of the asymptote

to find the asymptote set den = 0 and solve

end behavior:(horizontal (HA) or oblique (OA)):

to find the asymptote - compare the degrees of the num and den. if top heavy (OA):

bottom heavy (HA): y = 0

equal (HA): divide coefficients

oblique: (more later)

Increasing, Decreasing and Constant

- as you move from left to right the y-values increase
- as you move from left to right the y-values decrease
- as you move from left to right the y-values do not change

this behavior is reported using interval notation for the x-values where the graph has a certain behavior

Extrema

maximums
- relative (local)
- absolute (upper bound)

minimums
- relative (local)
- absolute (lower bound)

Odd/Even/Neither Symmetry (card title)

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

symmetry with respect to the origin

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

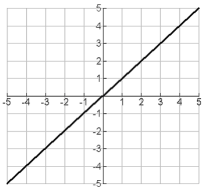
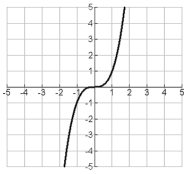
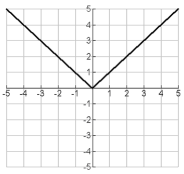
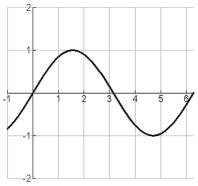
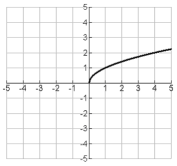
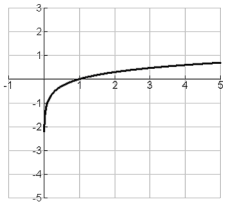
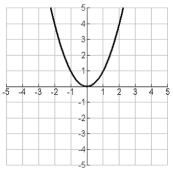
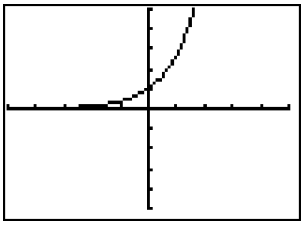
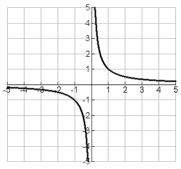
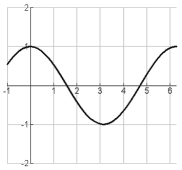
symmetry with respect to the y-axis

Neither

1.3

$f(x) = x^2$ f(x) = x $f(x) = x^3$ $f(x) = \ln x$ $f(x) = |x|$

$f(x) = e^x$ $f(x) = \sin x$ $f(x) = \sqrt{x}$ $f(x) = \cos x$ $f(x) = \frac{1}{x}$

Piecewise Functions

certain pieces of the function have specific behavior

frequently: intervals (parts) of the domain are associated with different functions (related to continuity)

$$f(x) = \begin{cases} x+1 & if \ x \leq 0 \\ x & if \ x > 0 \end{cases}$$

1.4

Composition of Functions - defined

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

Finding the domain of a composition

$f(x) = x^2 - 1$ $\qquad$ $g(x) = \sqrt{x}$

$(g \circ f)(x)$

$(f \circ g)(x)$

1. What is the domain of the first function?
2. Find the domain restrictions of the new function
3. Put them together

1.5

Finding an Inverse Algebraically (card)

Steps:

1. replace f(x) or relation name w/ y if not in that form

2. switch the x & y in the eq. (just x & y not signs, coefficients, or exponents)

3. Solve for y.

4. replace y with relation name $^{-1}$ (f^{-1} or g^{-1})

Domain changes
Range changes

$$y = \pm\Theta f(\pm\#(x \pm \Delta)) \pm \blacksquare$$

$\pm$ if (−) reflection over x-axis (range Δ)

Θ vertical expansion or compression (range Δ)

$\Theta > 1$ expansion

$\Theta < 1$ compression

x's lie

$\pm$ if (−) reflection over y-axis (domain Δ)

$\#$ horizontal expansion or compression (domain Δ)

$0 < \# < 1$ expansion

$\# > 1$ compression

Δ translation left or right (domain Δ)

(+) left (-) right

$\blacksquare$ translation up or down (range Δ)

(+) up (-) down