Calc 1, Tuesday 8/27/2013

* 1. Functions

Y = f(x)

Y = x +5 line

Y = (x^2) -10 parabola

Inputs: DOMAIN outputs: RANGE

* A function is a rule or mapping where each input has a unique output

F: X

A 🡪 1

B 🡪 3

C 🡪 2

Graph: set of all points (x, f(x)) where x is in the domain of function y = f(x)

* (lines and parabolas are functions, ellipses are not; does not pass the “vertical line test”)

EX: What is the domain and range of y = [ ( (x^2)-16) ^ (1/2) ]?

🡪Arguments in the square root must be non-negative

(x^2) >=16 🡪 x >=4 or x <= -4

* Formal answers: the domain is set of all x such that
  + - x >=4 or x <= -4
    - (-∞, -4] and [ 4, ∞)
    - (\*GRAPH\*)

Range: 0 <= y <∞ or [0, ∞)

Piecewise functions:

Ex: absolute value function

|x| = {x if x >=0

{-x if x < 0

{x if x < -2

Format of piecewise functions: f(x) = {(x^2) if -2 <= x <= 2 (\*GRAPH\*)

{4 if x > 2

Domain is all reals (-∞, ∞) (i.e. passes vertical line test)

Range is: (-∞, -2) and [0, 4] OR -∞ < y < -2 and 0 <= y <= 4

Increasing functions: f(x2 ) > f(x1 ) whenever x2 > x1

F(b) > f(a) b > a

Decreasing functions: (opposite of increasing functions)

Even functions: f(-x) = f(x) (\*GRAPH\*) Symmetric about y-axis y= |x| y = cos(x)

Even powers of x: (x^2), (x^4), etc.

Odd functions: f(-x) = -f(x) (\*GRAPH\*) Symmetric about origin y = sin(x)

Odd powers of x: x, (x^3), (x^5), etc.

Types of functions:

* Algebraic functions:
  + Square root function
  + quadratic function
  + power function
  + polynomial function
  + rational function
* Trig. Function
* Logarithmic function
* Exponential function
  1. Create New Functions

F(x) = [ (x +5) ^ (1/2)] Domain of f: x >= -5

G(x) = x-4 Domain of g: all reals

F(x) + G(x) }

F(x) – G(x) } find domain by looking at intersection of original domains

F(x) \* G(x) }

F(x) / G(x)

G(x) / F(x)

* + - For division: Intersection of original domains and denominator ≠ 0