2.4 Library of Functions; Piecewise-defined functions

Should already know what these graphs look like (most are in the front cover of our book): linear, constant, identity, square, cube, square root, reciprocal, absolute value functions.

Greatest-Integer Function

f(x) = int(x) = greatest integer less than or equal to x

x	y
-1	
-.75	
-.5	
-.25	
0	
.25	
.50	
.75	
1	

When graphing the greatest-integer function w/ graphing calc...make sure to be in "dot mode".

The domain of the greatest-integer function is the set of all real #'s; it's range is the set of integers.

The y-int is 0 and the x-intercepts lie in the interval [0,1). The greatest-integer function is neither even nor odd. It is constant on every interval of the form [k,k+1) where k is an integer.

In the 1st figure, we used a solid dot to indicate that at x = 1 the value of f is f(1) = 1. We use an open paren to illustrate that the function does not assume the value of "0" at x = 1.

Piece-wise defined functions - defined by more than one equation

Sometimes a function is defined differently on different parts of its domain. For example: the absolute value function $f(x) = x$ is actually defined by 2 equations

$f(x) = x$ if $x \geq 0$

$f(x) = -x$ if $x < 0$ this can also be written as:

Ex. 1 pg. 130 Analyzing a piece-wise defined function

$$f(x) = \begin{cases} -x + 1 & \text{if } -1 \le x < 1 \\ 2 & \text{if } x = 1 \\ x2 & \text{if } x > 1 \end{cases}$$

a) find f(0), f(1), f(2)
b) determine domain of f
c) graph f
d) use graph to find range of f

Ex. 2 Cost of electricity

An electric company charges $7.57 plus 8.77 cents per Kilowatt hour (KWhr) for the first 400 KWhr supplied in a month and 6.574 cents per KWhr for all usage over 400 KWhr in the month.

a) what is the charge for using 300 KWhr in a month?
b) what is the charge for using 700 KWhr in a month?
c) if c is the monthly charge for x KWhr express c as a function of x
d) graph part c