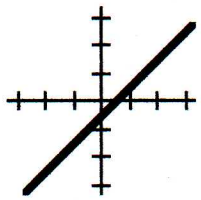
Library of Functions:

Linear Function:

Form: $y = ax+b$

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

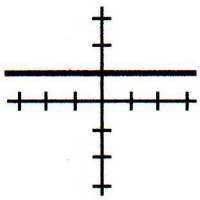


Constant Function:

Form: $y = b$; b a constant

Domain: $\mathbb{R}$

Range: $y = b$

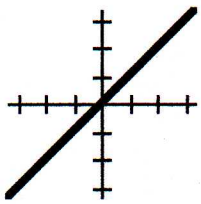


Identity Function:

Form: $y = x$

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

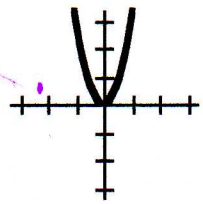


Square Function:

Form: $y = x^2$

Domain: $\mathbb{R}$

Range: $y \geq 0$

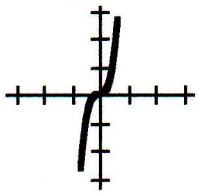


Cube Function:

Form: $y = x^3$

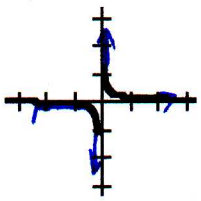
Domain: $\mathbb{R}$

Range: $\mathbb{R}$



Reciprocal Function:

Form: $y = \frac{1}{x}$

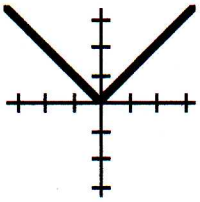


Domain: $x \neq 0$; $\mathbb{R}$

Range: $(-\infty, 0) \cup (0, \infty)$

Absolute Value Function:

Form: $y = |x|$



Domain: $\mathbb{R}$

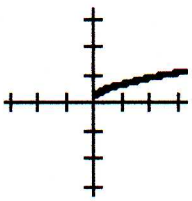
Range: $[0, \infty)$

Square Root Function:

Form: $y = \sqrt{x}$

$x \geq 0$

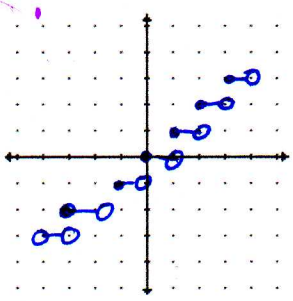
Domain: $x \geq 0$



Range: $[0, \infty)$

Greatest Integer Function:

Form: $y = [\![x]\!]$



step function rounds down

Domain: $\mathbb{R}$

Range:

$\ldots, -2, -1, 0, 1, 2, \ldots$

The Piecewise function:

26. $f(x)=\begin{cases} x^3 & \text{if } x<0 \\ 3x+2 & \text{if } x\geq 0 \end{cases}$

Added by Me:

d) Domain $\mathbb{R}$

e) Range: $(-\infty,0)\cup[2,\infty)$

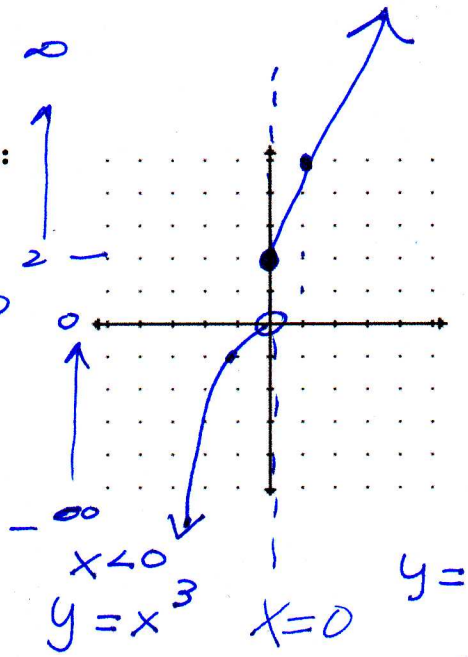
Find: a) f(–1) $= (-1)^3 = -1$

b) f(0) $= 3(0)+2 = 2$

use graph

c) f(1) $= 3(1)+2 = 5$

Graph:



x	y
0	0 open
−1	−1
−2	−8

x	y
0	2
1	5
2	8

f) x-intercept(s) if any

none

g) y-intercept if any

(0, 2)

In Problems 29-40:
(a) Find the domain, (b) Find the Intercepts (c) Graph (d) Find the Range

32. $f(x) = \begin{cases} x+3 & \text{if } x < -2 \\ -2x-3 & \text{if } x \geq -2 \end{cases}$ ① ②

(a) Find the Domain

$\mathbb{R}$

(b) Find the Intercepts

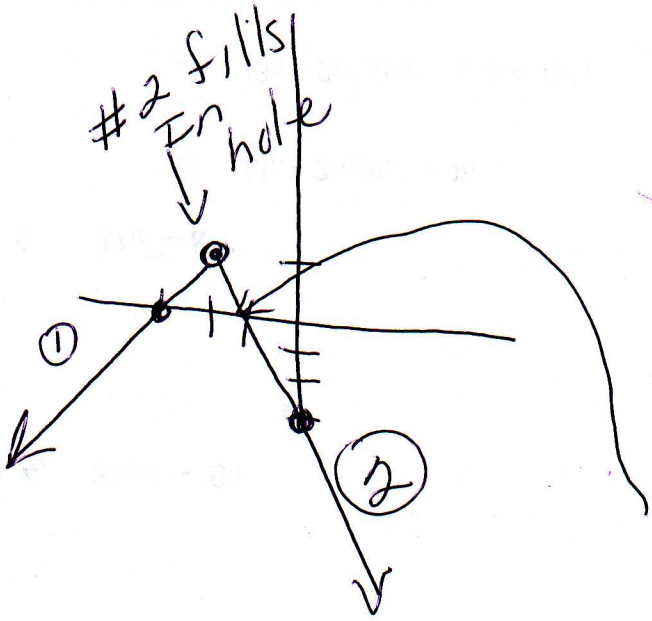
x Int: $(2,0)$ $\left(-\frac{3}{2},0\right)$

y Int: $(0,3)$

(d) Find the Range

$\mathbb{R}$

Graph



① $x < -2$

$y = x + 3$

x	x+3	
-2	1	open
-3	0	← x-Intercept

② $x \geq -2$

$y = -2x - 3$

x	-2x-3	
-2	1	Solid
0	-3	← y-Intercept

there is a second x-Intercept on graph #2

Let $y = 0$ for #2

$-2x - 3 = 0$ $x = -\frac{3}{2}$

$-2x = +3$

In Problems 29-40:
(a) Find the domain, (b) Find the Intercepts (c) Graph (d) Find the Range

34. $f(x)=\begin{cases} 2x+5 & \text{if } -3\le x<0 \\ -3 & \text{if } x=0 \\ -5x & \text{if } x>0 \end{cases}$

(a) Find the Domain

$x \ge -3$

(b) Find the Intercepts

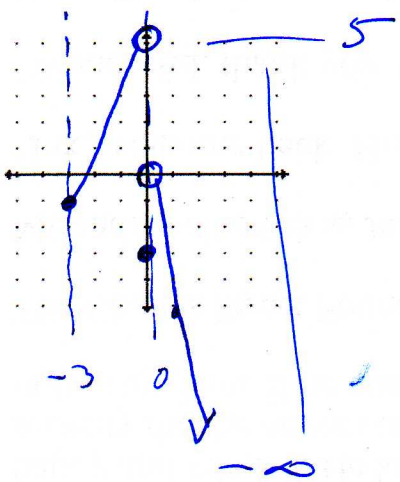
X-Int: $\left(-\frac{5}{2}, 0\right)$

y-Int: $(0, -3)$

(d) Find the Range

$(-\infty, 5]$

(c) Graph



$-3 \le x < 0$

x	2x+5
-3	-1 solid
0	5 open

$x = 0$ solid
$y = -3$

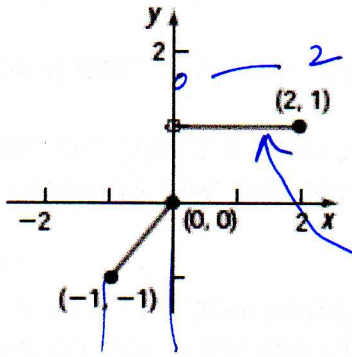
$2x+5=0$
$2x=-5$
$x=-\frac{5}{2}$

$x > 0$

x	-5x
0	0 open
1	-5

In Problems 41-44, the graph of a piecewise-defined unction is given. Write a definition for each function.

42.



$y = 1$

$x = -1$ $x = 0$

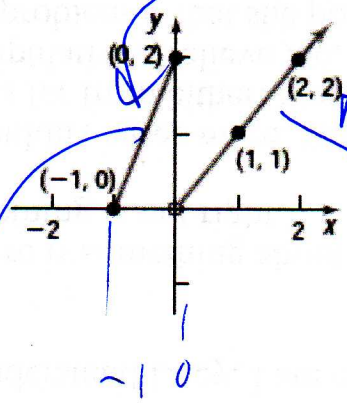
$m = \frac{0-(-1)}{0-(-1)} = \frac{1}{1} = 1$ $(0,0)$

$(y - 0) = 1(x - 0)$

$y = x$

$f(x) = \begin{cases} x & -1 \le x \le 0 \\ 1 & 0 < x \le 2 \end{cases}$

44.



$m = \frac{2-0}{0-(-1)} = \frac{2}{1} = 2$ $(0,2)$

$y = 2x + 2$

$m = \frac{2-1}{2-1} = 1$, $(1,1)$

$(y - 1) = 1(x - 1)$

$y - 1 = x - 1$

$y = x$

$f(x) = \begin{cases} 2x+2 & -1 \le x \le 0 \\ x & x > 0 \end{cases}$