

WARMUP

Given $f(x) = \begin{cases} 5x & \text{if } x \leq -5 \\ 3x-2 & \text{if } -5 < x < 1 \\ x^2+3 & \text{if } x \geq 1 \end{cases}$

"Piecewise-defined function"

find: 1) $f(-6) = 5(-6) = -30$

2) $f(-5) = 5(-5) = -25$

3) $f(0) = 3 \cdot 0 - 2 = -2$

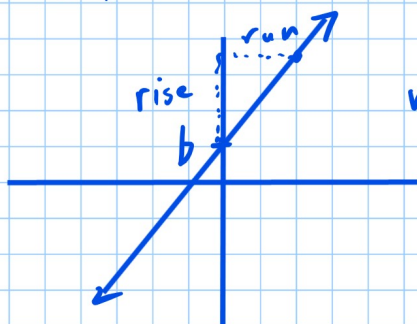
4) $f(1) = 1^2 + 3 = 4$

5) $f(6) = 6^2 + 3 = 39$

Section 2.4 Library of Functions; Piecewise-Defined Functions

Linear Function

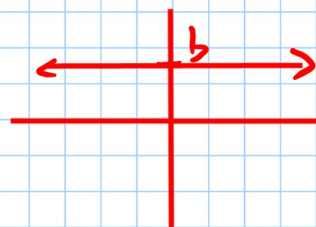
$$f(x) = mx + b$$



$$m = \frac{\text{rise}}{\text{run}}$$

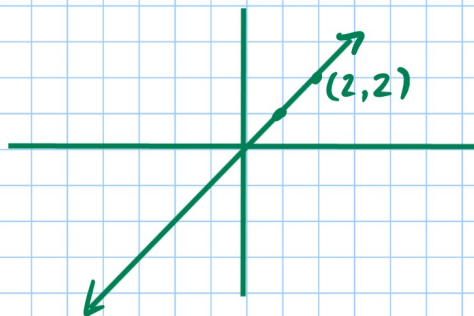
Constant Function

$$f(x) = b$$



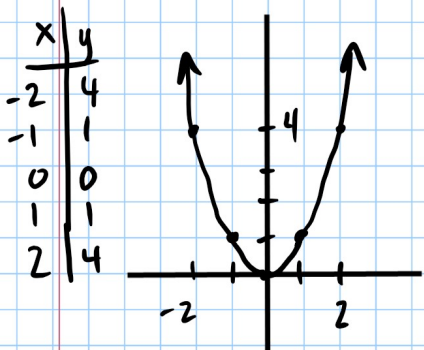
Identity Function

$$f(x) = x$$



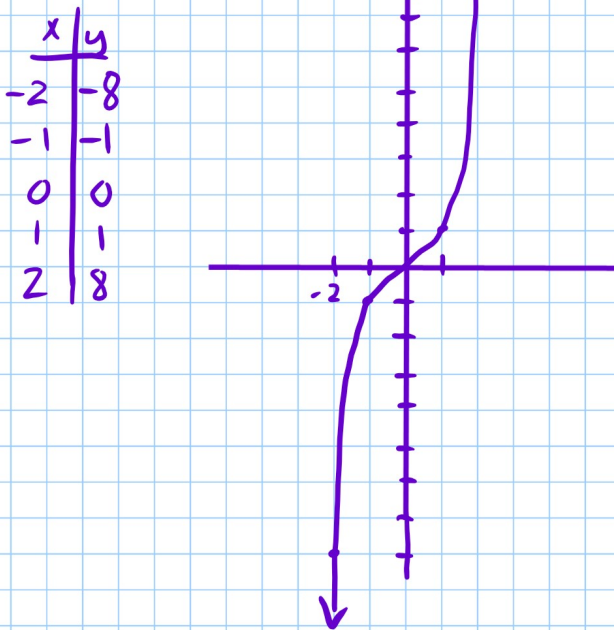
Square Function

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



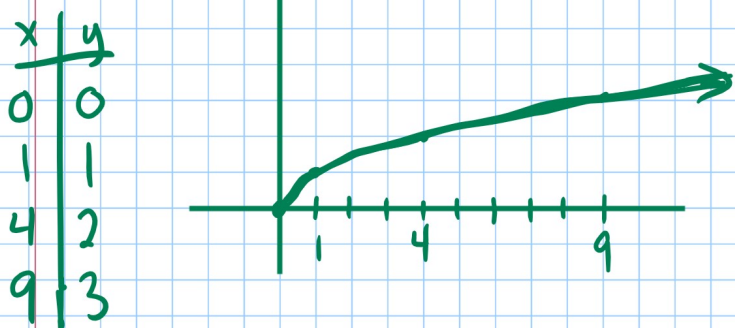
Cube Function

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



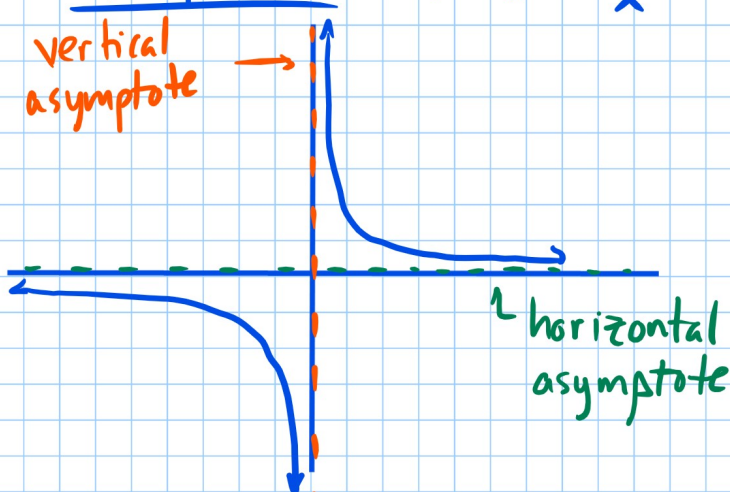
Square Root

$$f(x) = \sqrt{x}$$



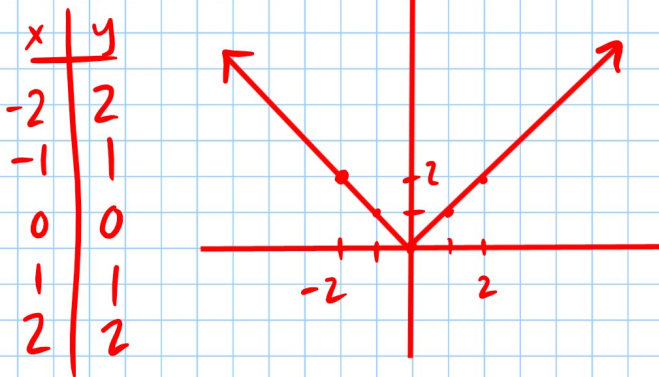
Reciprocal

$$f(x) = \frac{1}{x}$$



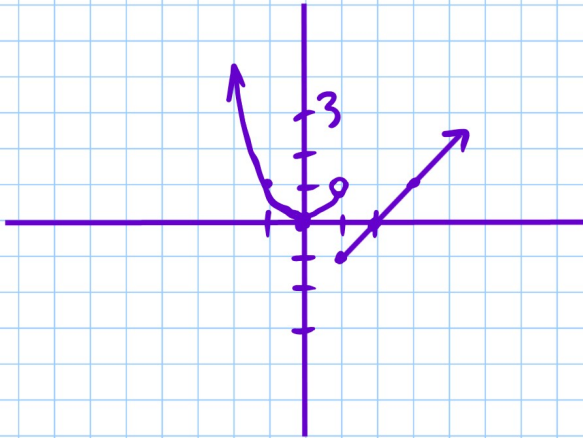
Absolute Value

$$f(x) = |x|$$



Piecewise - Defined

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

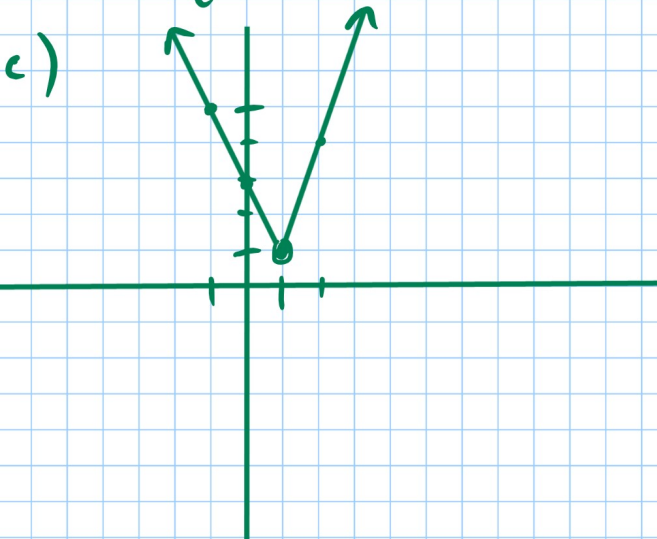


x	y
-1	1
0	0
1	1
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1	-1
2	0
3	1

$\left. \begin{matrix} -1 & 1 \\ 0 & 0 \\ 1 & 1 \end{matrix} \right\} x^2$
 ← open circle
 ← closed circle
 $\left. \begin{matrix} 1 & -1 \\ 2 & 0 \\ 3 & 1 \end{matrix} \right\} x-2$

p132-133 15, 16, 21, 23, 27, 28, 31, 35

$$21) f(x) = \begin{cases} -2x+3 & x < 1 \\ 3x-2 & x \geq 1 \end{cases}$$



x	y
-1	5
0	3
1	1
<hr/>	
1	1
2	4
3	7

$\left. \begin{matrix} -1 & 5 \\ 0 & 3 \\ 1 & 1 \end{matrix} \right\} -2x+3$
 open
 closed
 $\left. \begin{matrix} 1 & 1 \\ 2 & 4 \\ 3 & 7 \end{matrix} \right\} 3x-2$

a) $D = (-\infty, \infty)$

b) $(0, 3)$

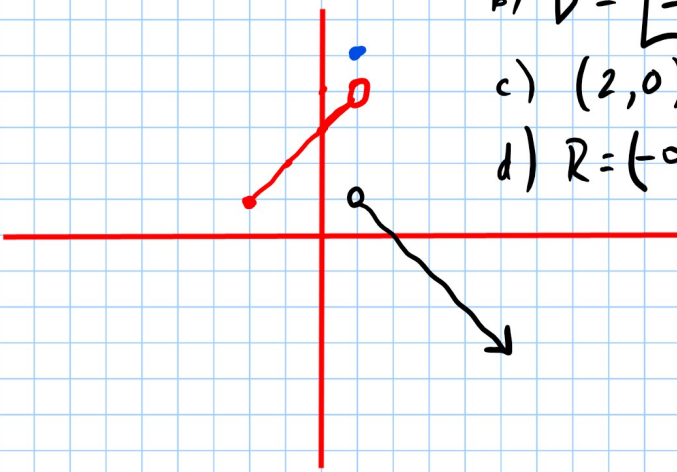
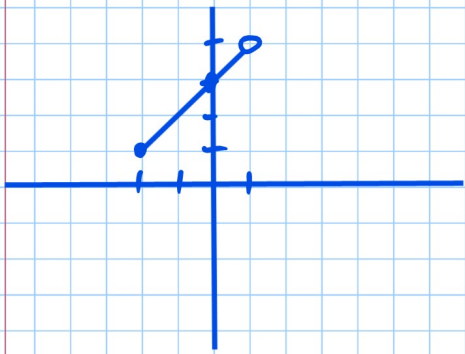
d) $R = [1, \infty)$

$$23) f(x) = \begin{cases} x+3 & -2 \leq x < 1 \\ 5 & x = 1 \\ -x+2 & x > 1 \end{cases}$$

x	y
-2	1
0	3
1	4
<hr/>	
1	5
<hr/>	
1	1
2	0

← closed
 ← open
 ← closed
 ← open

3|-1



b) $D = [-2, \infty)$

c) $(2, 0), (0, 3)$

d) $R = (-\infty, 4) \cup [5, 5]$