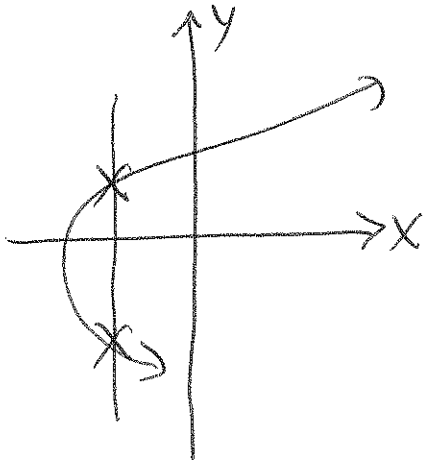
2.1/2.2N Reading Graphs; Domain and Range

A. Vertical Line Test

1. Used to determine if a graph represents a function of x.

2. Test: If any vertical line crosses the graph (over its domain) any time other than once, it is not a function.

3. Example:



not a function

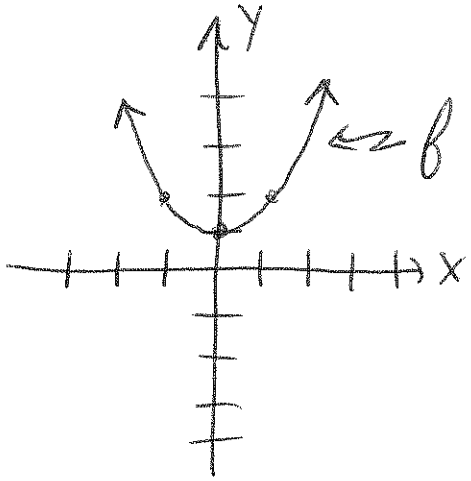
B. Determining Domain and Range From a Graph

1. Domain: Scan across the x-axis with a vertical line to see which x-values get used (i.e. which x-values does the line hit the graph?)

2. Range: Scan across y-axis with a horizontal line to see which y-values get used (i.e. which y-values does the line hit the graph?)

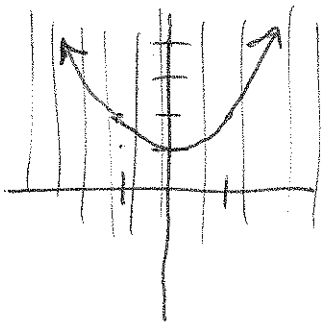
C. Examples of Domain/Range Finding with Graphs

Example1: Find dom f and rng f for f given below:



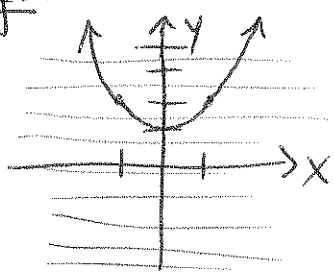
Solution

Domain: Scan across with vertical lines



all x-values used, since vertical line always hits graph: $\boxed{\text{dom } f = (-\infty, \infty)}$

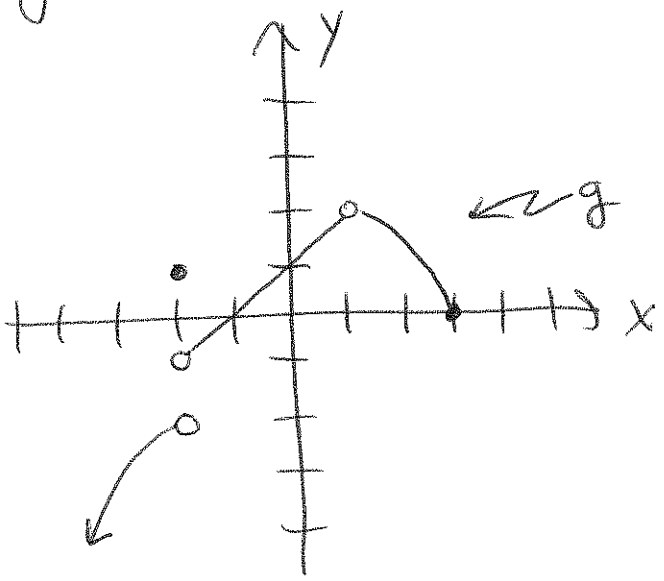
Range: Scan across with horizontal lines



only lines at $y=1$ or above hit graph

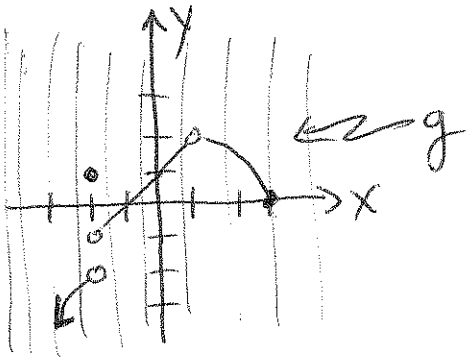
$\boxed{\text{rng } f = [1, \infty)}$

Example 2: Find dom g and rng g for g given below:



Solution

Domain: Scan across with vertical lines:



left of $x=-2$: vertical lines hit the graph (arrow!)

at $x=-2$: ← graph hits this

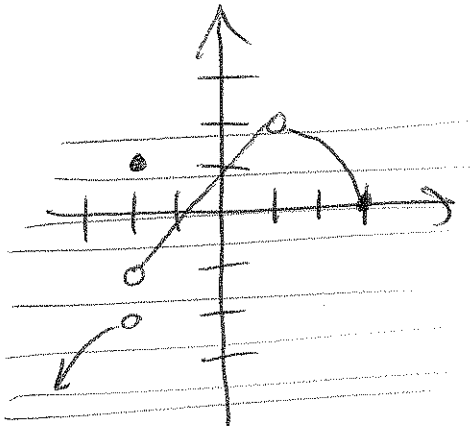
at $x=1$: ← graph doesn't get hit

beyond $x=3$: graph does not get hit

x-values hit:

$$\boxed{\text{dom } g = (-\infty, 1) \cup (1, 3]}$$

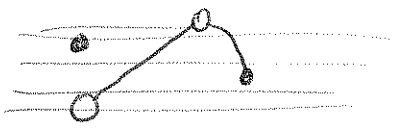
Range: scan across with horizontal lines



below $y=-2$: graph gets hit

between $y=-2$ and $y=-1$:

from $y=-1$ to $y=2$



graph gets hit (sometimes more than once)

between $y=-1$ and $y=2$ (not at though)

at $y=2$:

missed

above $y=2$: missed

y-values hit:

$$\boxed{\text{rng } g = (-\infty, -2) \cup (-1, 2)}$$