3.7 - Graphs of Functions

→ Graphing a function is the same as graphing an equation

→ To graph $f(x) = x^2$, we graph $y = x^2$

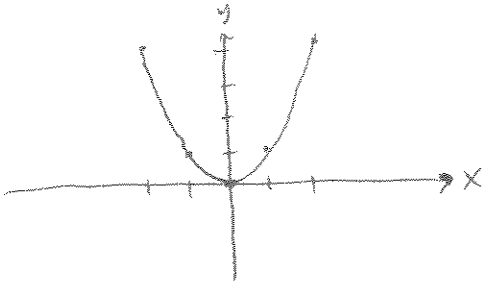
→ we can make a table of values

x	$y = x^2$
-2	4
-1	1
0	0
1	1
2	4

→ for easy rules, like $f(x) = x^2$, we can often do this in our head.

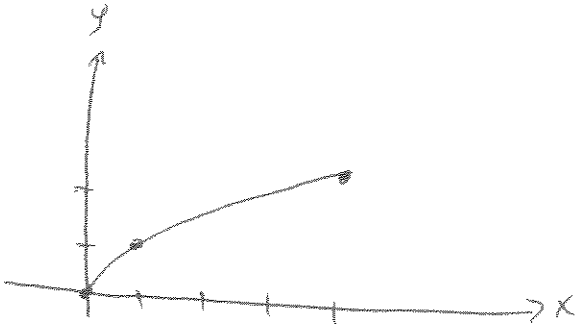
↳ we choose an x value, we compute the corresponding y value, and we plot the point.

↳ we continue until we have enough points to draw the function.



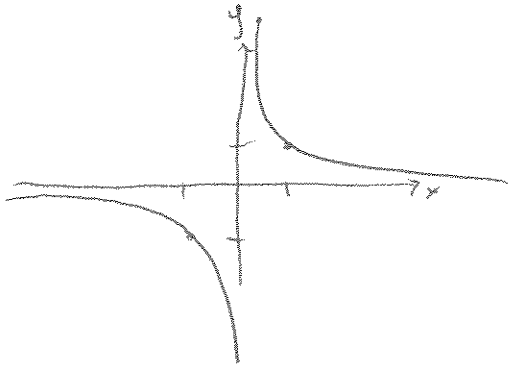
EX Plot $f(x) = \sqrt{x}$.

↳ choose x's that are perfects squares since they're easy to take the square root of.



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

→ think about what happens for x near zero and x very far from zero



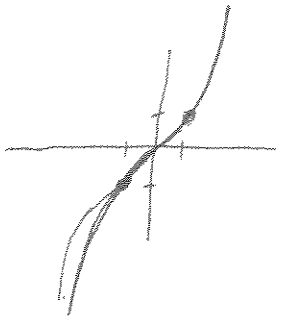
→ If we have a function, we can draw its graph.

↳ If we have a graph, can we figure out if that graph corresponds to a function?

↳ Yes! we use the vertical line test

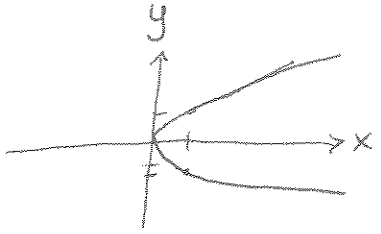
→ If you can draw a vertical line through any part of a graph and that vertical line touches the graph more than once, the graph does <u>not</u> represent y as a function of x.

Ex $y = x^3$



→ a function. It passes the vertical line test. y is a function of x

$y^2 = x$



- It fails the vertical line test. y is not a function of x because there are 2 outputs for each input

- The vertical line test just tests to see if there is a unique output for each input.

- Can we plot a function without plotting points?
  - sometimes

Ex Suppose $y = f(x)$ with $f(x) = \sqrt{x}$

a) $g(x) = \sqrt{x} + 1$ → shift up 1 unit

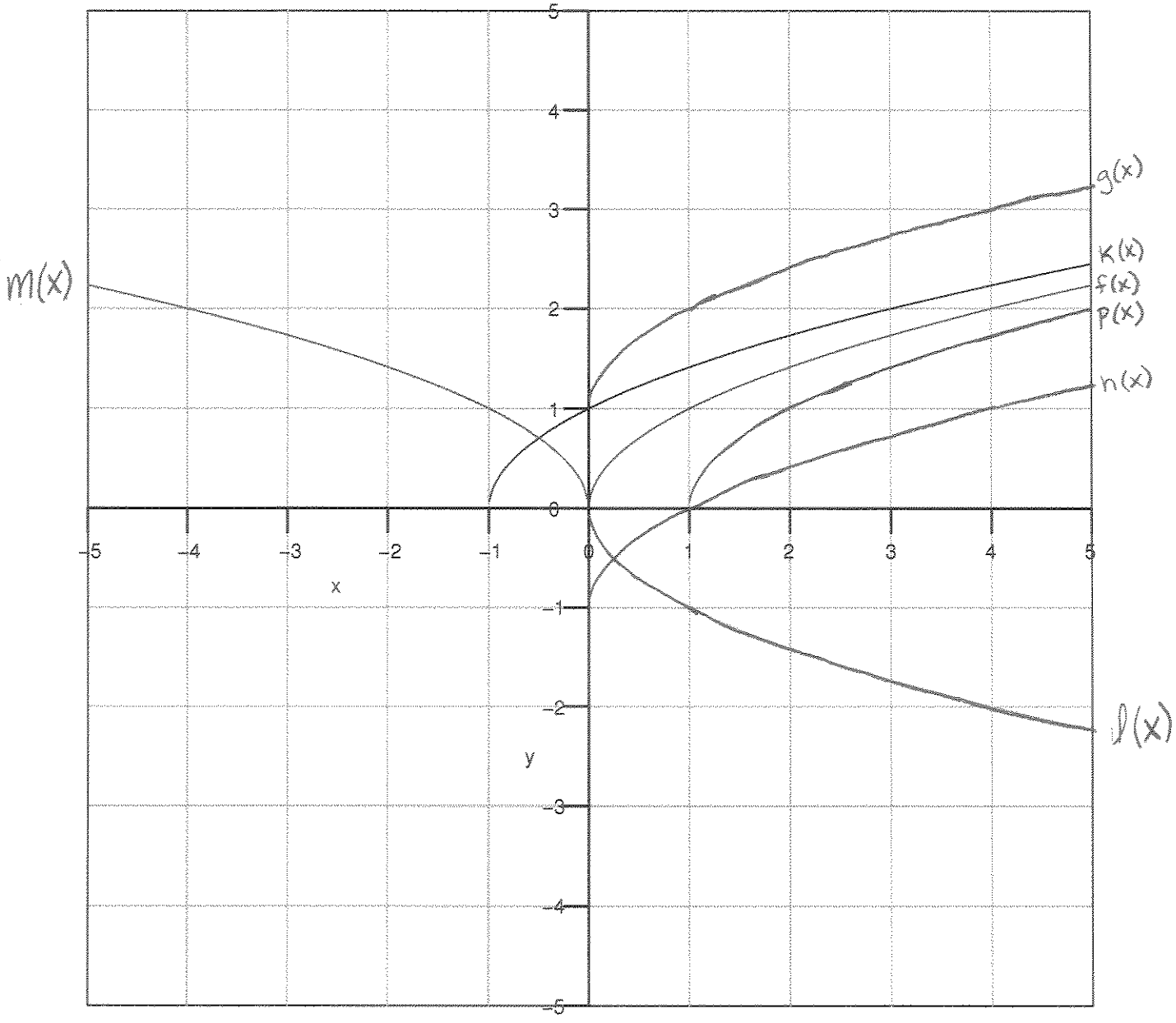
b) $h(x) = \sqrt{x} - 1$ → shift down 1 unit

c) $k(x) = \sqrt{x+1}$ → shift left 1 unit

d) $p(x) = \sqrt{x-1}$ → shift right 1 unit

e) $l(x) = -\sqrt{x}$ → flip across x-axis

f) $m(x) = \sqrt{-x}$ → flip across y-axis


m(x)
g(x)
k(x)
f(x)
p(x)
n(x)
l(x)
x
y
-5
-4
-3
-2
-1
0
1
2
3
4
5