

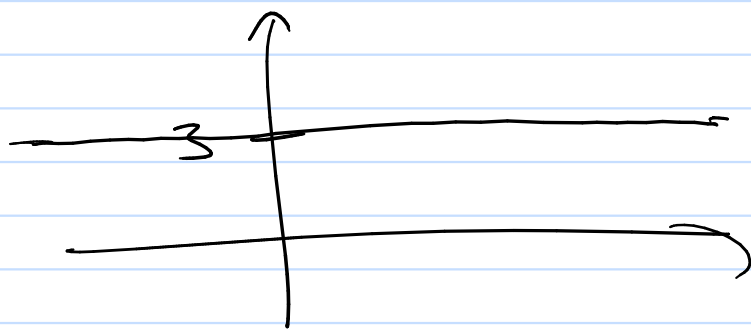
Math 112

Q's

Domain?
(input)

Codomain?
("possible" outputs)

Range?
(actual output)

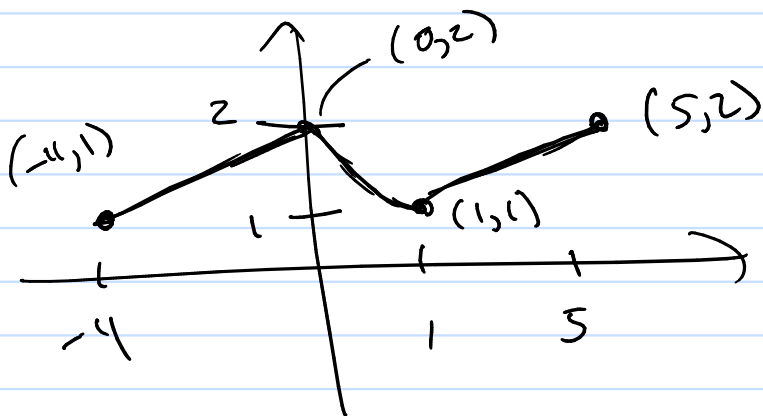


$$y = 3$$

Domain: \Rightarrow All reals
 $\Rightarrow \mathbb{R}$
 $\Rightarrow (-\infty, \infty)$

Codomain: $\Rightarrow (-\infty, \infty)$

Range: $\{3\}$



Domain:

$\boxed{[-4, 5]}$
 $\{x \mid -4 \leq x \leq 5\}$

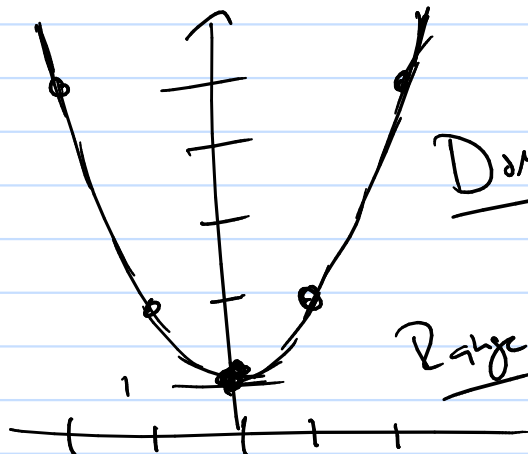
Range:

$\{y \mid 1 \leq y \leq 2\}$
 $\boxed{[1, 2]}$

(4)

$$y = x^2 + 1$$

x	y
-2	5
-1	2
0	1
1	2
2	5



Domain:

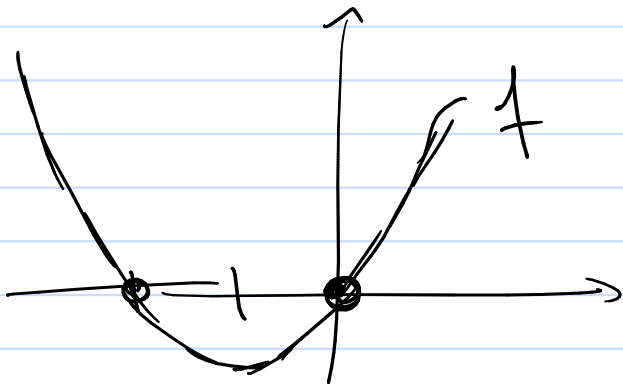
$(-\infty, \infty)$

Range: $[1, \infty)$

1.5 $f(x) = x^2 + 2x$

b/c f is a polynomial

Domain: $(-\infty, \infty)$



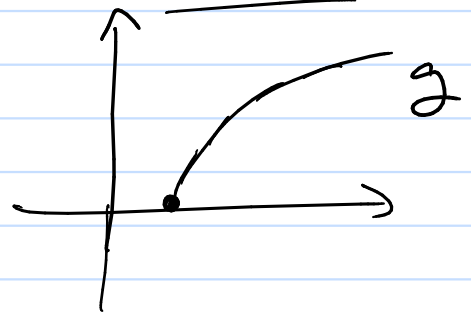
$$g(x) = \sqrt{x-1}$$

b/c g is a radical function (neg inside $\sqrt{\quad}$ is imaginary)

$$\underline{\underline{x-1 \geq 0}}$$

$$x \geq 1$$

Domain: $[1, \infty)$



$$(f+g)(x) = f(x) + g(x)$$

$$= (x^2 + 2x) + (\sqrt{x-1})$$

$$= x^2 + 2x + \sqrt{x-1} \quad \text{Domain: } [1, \infty)$$

$$(f-g)(x) = f(x) - g(x)$$

$$= x^2 + 2x - \sqrt{x-1}$$

Domain: $[1, \infty)$

$$(fg)(x) = f(x)g(x)$$

$$= (x^2 + 2x)\sqrt{x-1}$$

Domain: $[1, \infty)$

$$(f/g)(x) = \frac{f(x)}{g(x)} = \frac{x^2 + 2x}{\sqrt{x-1}}$$

Domain: $(1, \infty)$

Given a graph we are supposed to "know"?

① how to get a graph?

② Given graphs, special properties?

- Symmetric about y-axis?

- Symmetric about origin?

- y-axis intercept

- x-axis intercept(s)

③ Extreme values? (Max or Min)

Graph: set of all (x, y) so that $y = f(x)$ is true.

So make table of values

① Just do it

x	y = f(x)
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How?

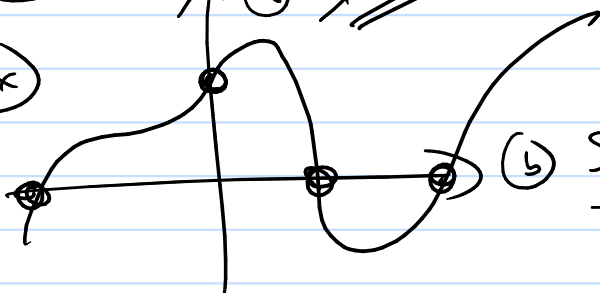
be a bit smarter

Pick lots of x's

②

Intercepts

ex



③ Symmetry

Intercepts:



x-axis let $y=0$ so solve $0 = f(x)$

(ex) $y = x^2 - x$

x-axis intercepts

x	$y = x^2 - x$
0	0
1	0
$\frac{1}{2}$	$\frac{1}{4} - \frac{1}{2} = \frac{1}{4} - \frac{2}{4} = -\frac{1}{4}$
2	$4 - 2 = 2$
-1	$1 - (-1) = 2$

let $y=0$
 $0 = x^2 - x$

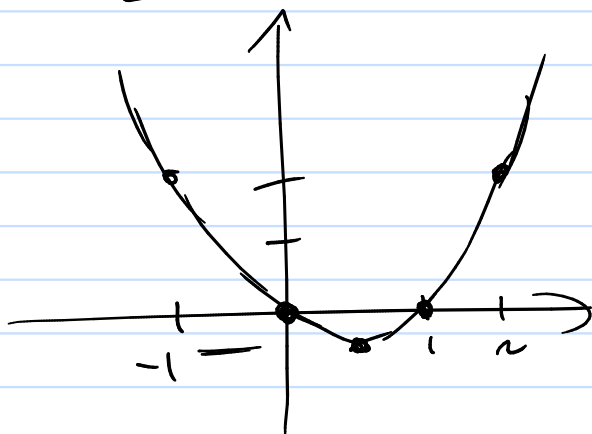
$0 = (x)(x-1)$

$x=0$

$x-1=0$

$(0,0)$

$x=1$
 $(1,0)$

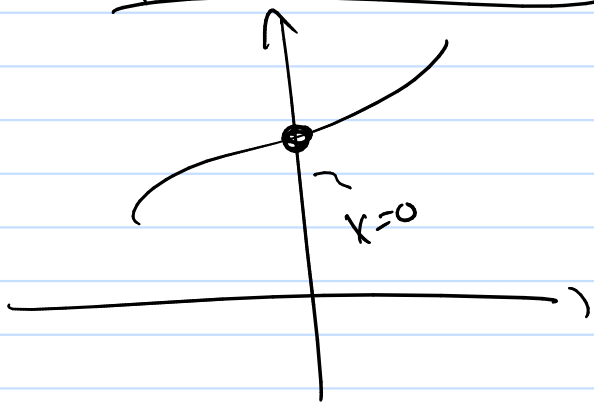


y-axis intercepts

let $x=0$ and find $y=f(0)$

(ex) $y = x^2 + 1$

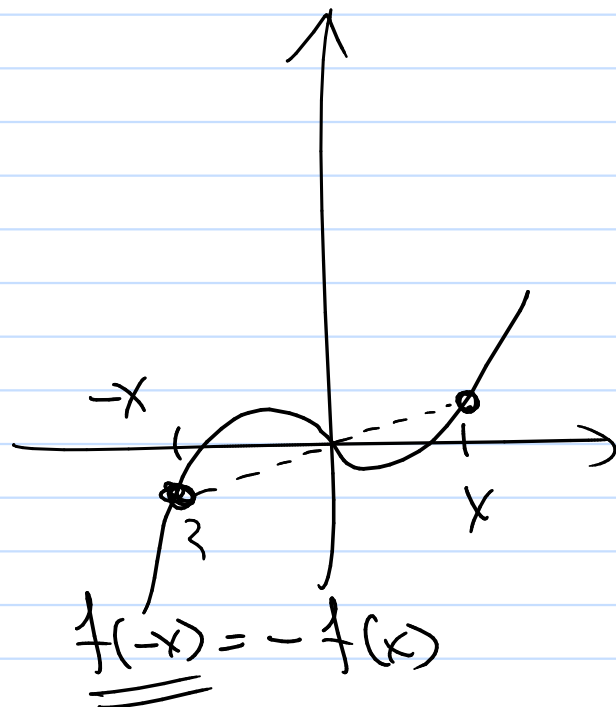
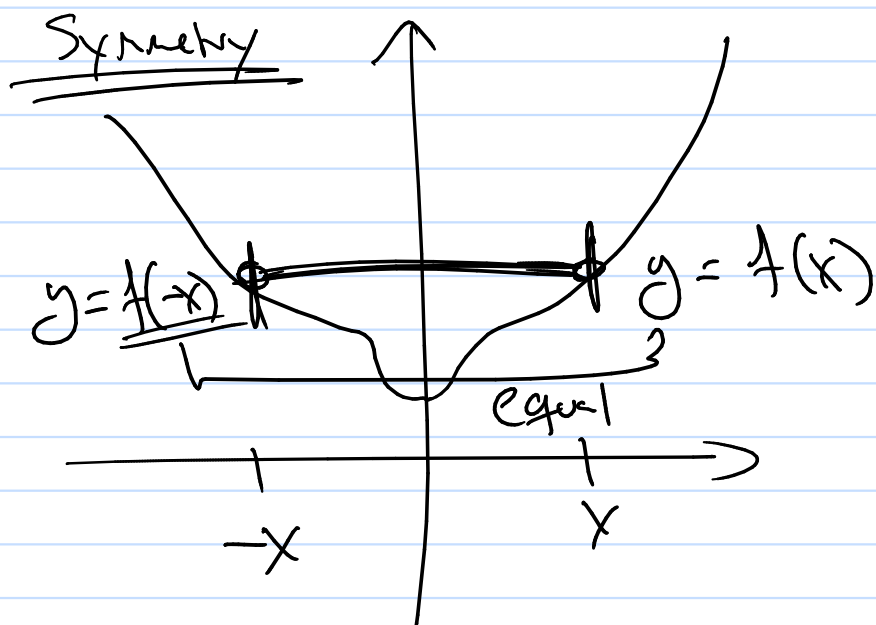
y-axis intercept



x	y
0	1

$y = 0^2 + 1$
 $y = 1$

$(0,1)$



check: $f(-x) = ?$

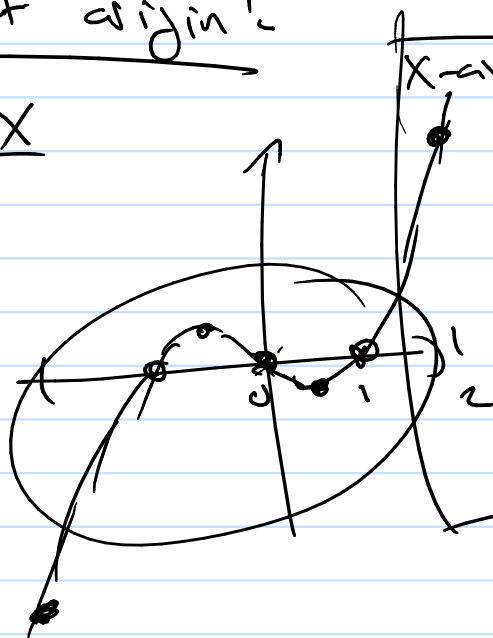
(ex) $f(x) = x^3 - x$ | $f(x) = x^3 - x$

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

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

Sym about origin!

x	$y = x^3 - x$
1	0
0	0
-1	0
2	6
$\frac{1}{2}$	$-\frac{3}{8}$



x-axis intercepts (let $y=0$)

$$0 = x^3 - x$$

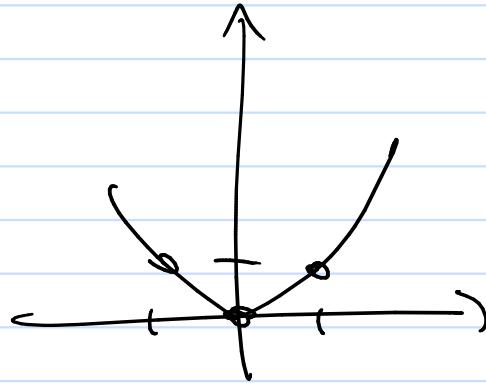
$$0 = x(x^2 - 1)$$

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

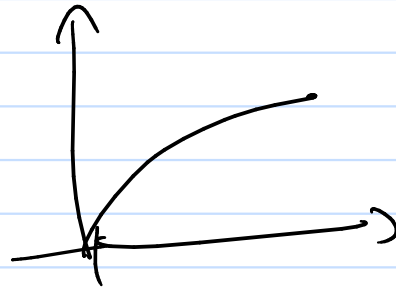
$$x=0 \quad x=-1 \quad x=1$$

Know a graph of $y = f(x)$

(ex) $y = x^2$



(ex) $y = \sqrt{x}$



Move graphs by translations

$$f(x) + h$$

$$f(x+h)$$

$$af(x)$$

$$f(ax)$$