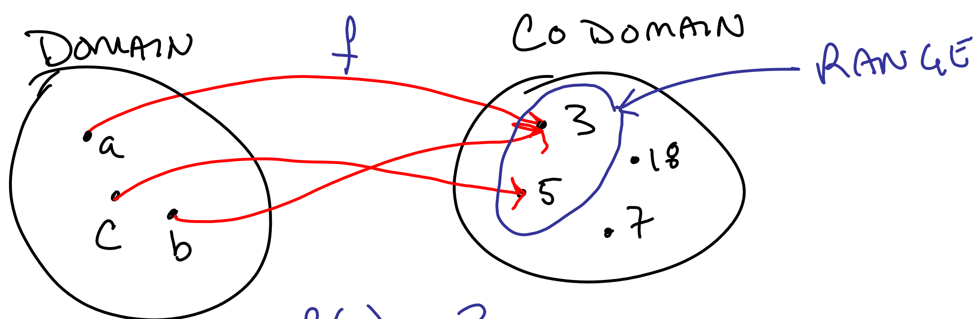
FUNCTIONS!

Dfn A FUNCTION IS A RULE THAT ASSIGNS TO EACH NUMBER IN ONE SET, EXACTLY ONE NUMBER FROM ANOTHER SET.

DOMAIN (ONE SET)

CODOMAIN / TARGET (ANOTHER SET)

ARROW DIAGRAM



$f(a) = 3$

$f(b) = 3$

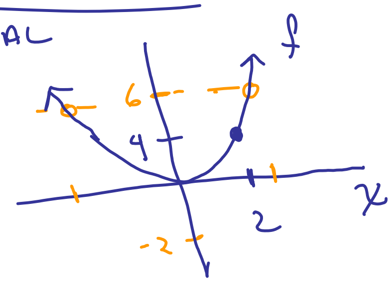
$f(c) = 5$

RANGE OF f IS $\{3, 5\}$.

ALGEBRAIC

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

GRAPHICAL



V.L.T.

A CURVE ON THE XY-PLANE REPRESENTS A FUNCTION IF NO VERTICAL LINE CROSSES IT MORE THAN ONCE.

TABLE

x	y
1	2
5	*
3	C

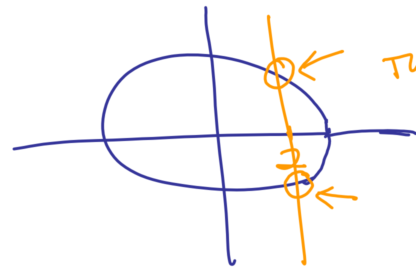
LIST

$f = \{(1,2), (5,*), (3,C)\}$

A WORD ON DOMAIN.

$f(x) = x^2 \quad , x \in \mathbb{R}$

$g(x) = x^2 \quad , x \in \mathbb{C}$



TWO y-VALUES ARE ASSIGNED TO 2!

NOT A FUNCTION.

<u>IMPLIED DOMAIN</u>

$f(x) = \sqrt{x+1}$

FIND DOMAIN of $f(x)$.

THE IMPLIED DOMAIN IS THE LARGEST COLLECTION OF <u>REAL</u> NUMBERS FOR WHICH THE FUNCTION "MAKES SENSE".

f CAN ONLY BE EVALUATED IF $x+1 \geq 0$, i.e. $x \geq -1$.

So, THE DOMAIN OF f IS $x \geq -1$ or $[-1, \infty)$.

ALGEBRAIC

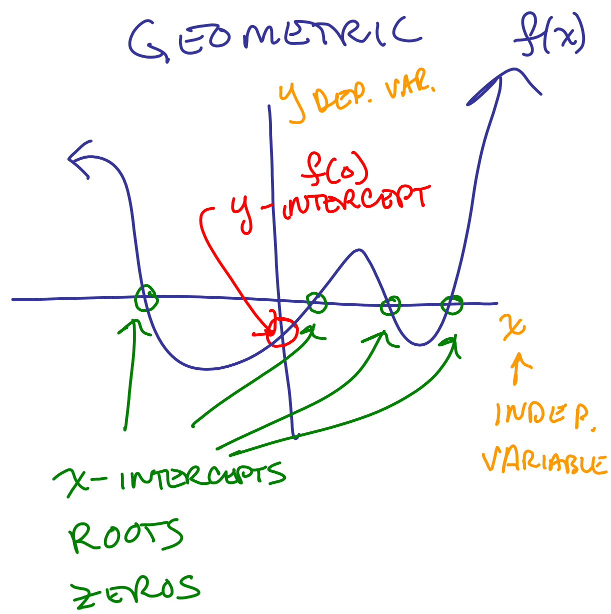
$y = f(x)$

DEPENDENT VARIABLE

INDEPENDENT

VALUES FOR WHICH $f(x) = 0$ (ie, sol'ns of the eqn) ARE CALLED ZEROS OR ROOTS OF $f(x)$.

GEOMETRIC



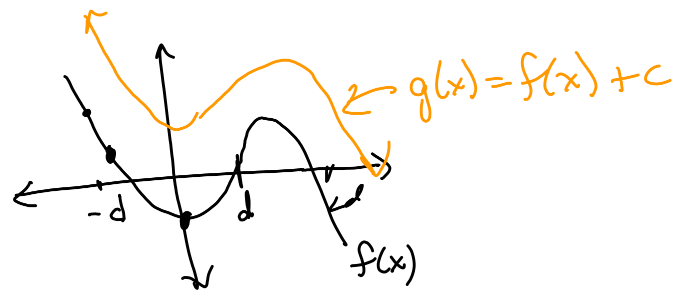
SHIFTING, SCALING, REFLECTING, 1.1

① SHIFTING.

$y = f(x)$

$g(x) = f(x) + \underline{\underline{c}}$

SHIFTS GRAPH UP BY C UNITS.

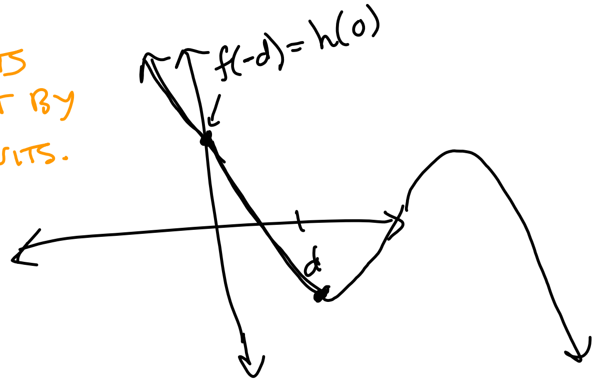


$h(x) = f(x \underline{\underline{-d}})$

SHIFTS RIGHT BY d UNITS.

$h(0) = f(0-d)$
$= f(-d)$

$h(d) = f(0)$

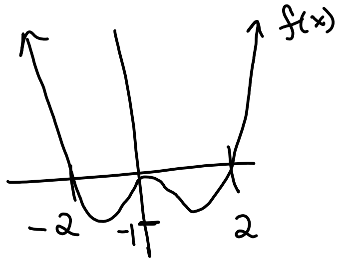


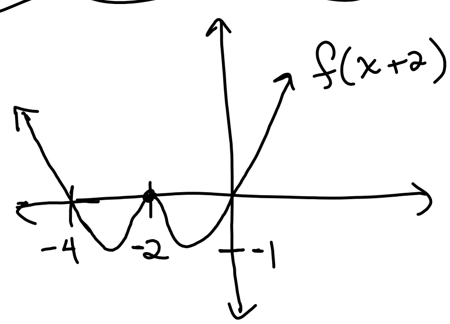
$y = f(x)$ $\qquad$ $y = f(x-c)$ $\qquad$ GO IN +x-DIRECTION (RIGHT) c UNITS.

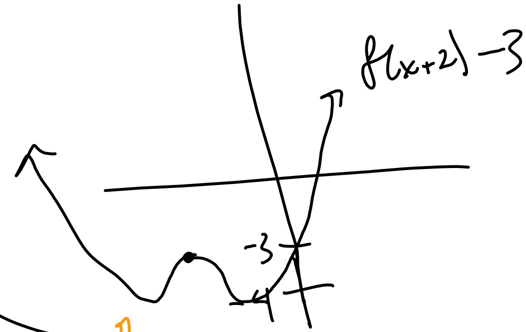
$y - c = f(x)$

$y = f(x) + c$ $\qquad$ SHIFT IN +y-DIRECT (UP) C-UNITS

$y = f(x+2) - 3$





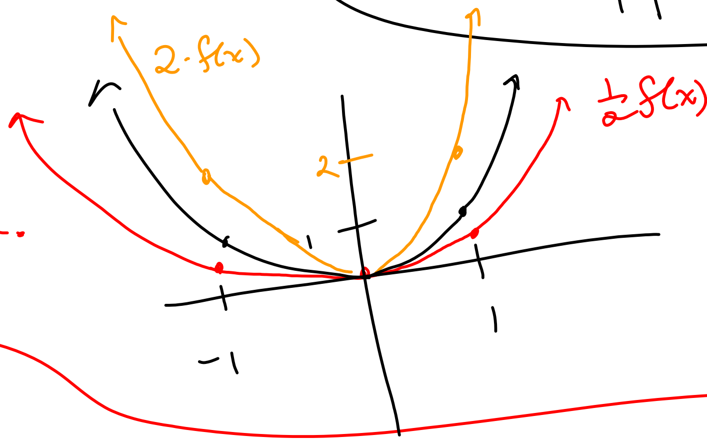


SCALING

$y = f(x)$, k IS A POSITIVE REAL NUMBER

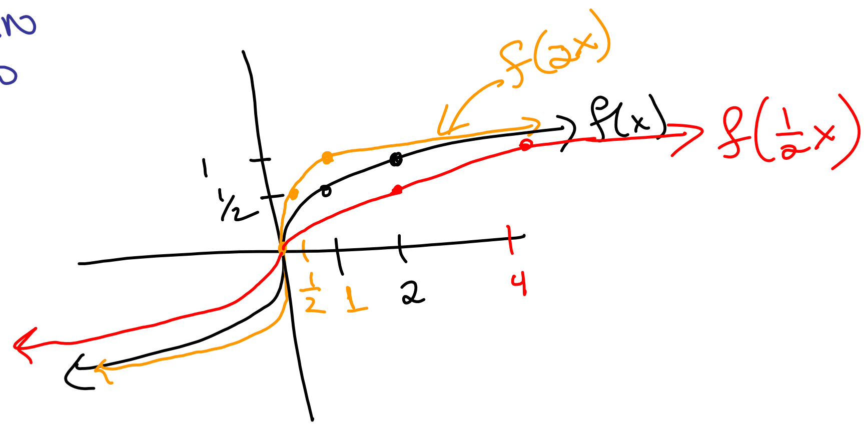
$g(x) = k \cdot f(x)$

STRETCH THE GRAPH VERTICALLY BY A FACTOR OF k.



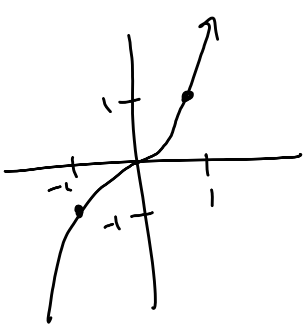
$h(x) = f(k \cdot x)$

SHRINK THE GRAPH IN HORIZONTAL DIRECTION BY FACTOR OF k.

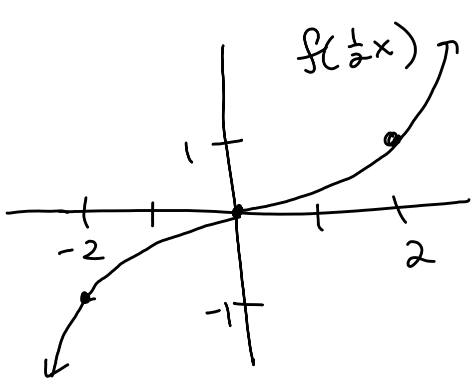


EXAMPLE

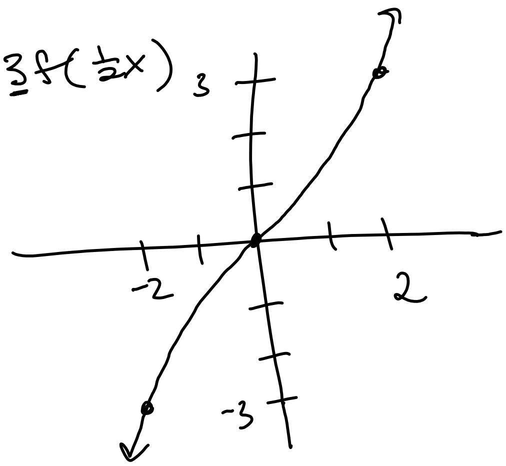
$y = f(x)$

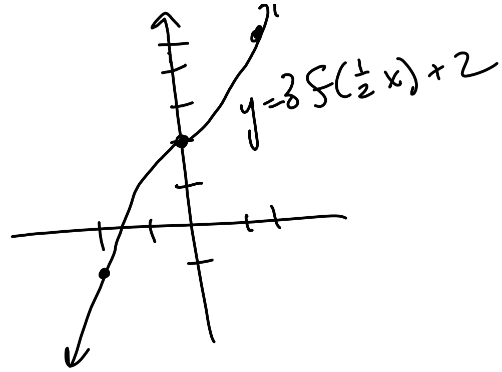


GRAPH $y = 3f(\frac{1}{2}x) + 2$

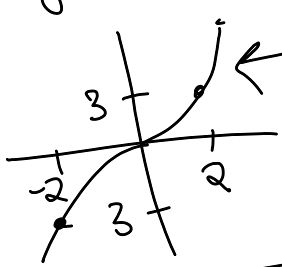


$3f(\tfrac{1}{2}x)$





$y = f(x)$ $3f(\tfrac{1}{2}x)$

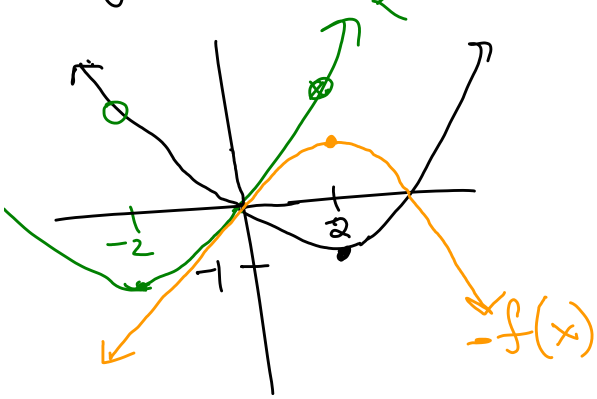


REFLECTING

$y = f(x)$

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

$g(2) = f(-2)$



ABS. VALUE

$y = f(x)$

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