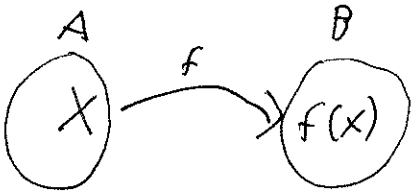
Math 115 - section 2.1 - 2013/01/23

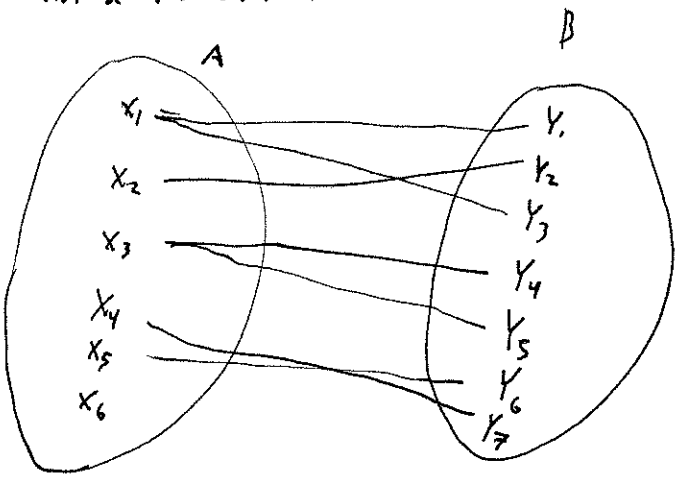
Function: A rule that assigns elements of set A to one and only one element of set B per element of set A.

the rule is denoted by a letter, say f, and it takes elements from our starting set A, which we call the domain and pairs them with elements in B, called our range.

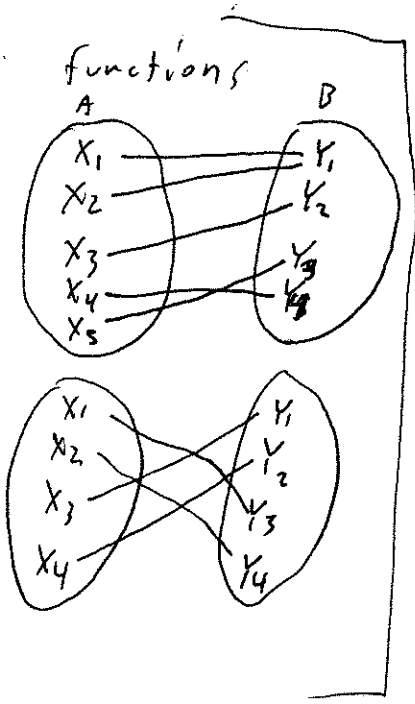


we can refer to all the elements that f maps to by saying $Y = f(X)$ as we let X take on all possible values

not a function



functions



f(x) ↘
f of x

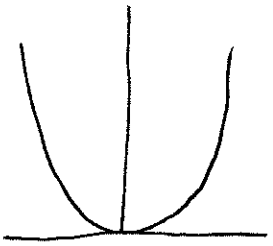
Y is the value of f at X

$f(X) = Y$ ↗

$f: A \to B$

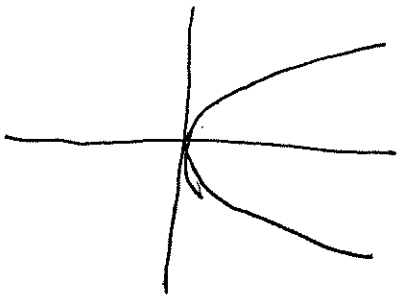
Compare the graphs of

$f(x) = x^2$ or $y = x^2$ and ~~$f(x) = \pm\sqrt{x}$~~ or $y^2 = x$



x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

vs



y	x
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

which passes the vertical line test?

Evaluating functions at specific points

$f(x)$ f of x

$f(x) = 2x^2 - x + 1$ or $f(\_\_) = 2(\_\_)^2 - (\_\_) + 1$

to evaluate the function at spefic points, fill in the blanks

$f(\underline{-2}) = 2(\underline{-2})^2 - (\underline{-2}) + 1$

$= 2(4) + 2 + 1$

$= 8 + 3$

$= 11$

$f(\underline{a+h}) = 2(\underline{a+h})^2 - (\underline{a+h}) + 1$

$= 2(a^2 + 2ah + h^2) - a - h + 1$

$= 2a^2 + 4ah + 2h^2 - a - h + 1$

$= 2a^2 + 2h^2 + 4ah - a - h + 1$

$$g(x) = \begin{cases} x^2 & \text{if } x > 3 \\ x - 3 & \text{if } x < 3 \end{cases}$$

find the value of the function for the following x values

$g(4)$ since $x > 3$

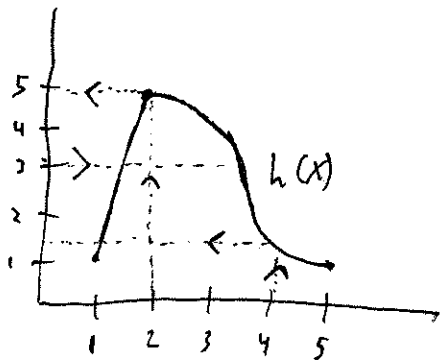
$g(x) = x^2$

$g(4) = 4^2 = 16$

$g(2)$ since $x < 3$

$g(x) = x - 3$

$g(2) = 2 - 3 = -1$



find $h(x)$ if $x = 2$

$h(2) = 5$

find $h(4)$

$h(4) = 1.5$

find x if $h(x) = 3$

$x = 1.5$, $x = 3.5$

Domain?

$[1, 5]$

Range?

$[1, 5]$

find the domain of $f(x) = \frac{9x^2 - 1}{x - 1}$

we will only not have function values if the denominator is zero

$x - 1 \neq 0 \Rightarrow x \neq 1$

domain is all x values so long as $x \neq 1$

Domain $(-\infty, 1) \cup (1, \infty)$

Point on the line?

does the point $(\frac{1}{2}, 1)$ lie on the line from $f(x) = 6x - 2$?

Does the point $(1, 5)$ lie on $f(x)$?

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

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

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

$f/g = (f(x)) / (g(x))$

if $f(x) = 3x + 1$, $g(x) = x + 2$

$fg = (f(x))(g(x)) = (3x+1)(x+2) = 3x^2 + 6x + x + 2$

$= 3x^2 + 7x + 2$

$f/g = (f(x))/(g(x)) = \frac{3x+1}{x+2}$