Note Title 11/15/2013

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

function f maps elements in X to elements in Y

$f: X \to Y$

is a subset of $X \times Y$.

For every $x \in X$ there is exactly one $y \in Y$ s.t. $(x,y) \in f$.

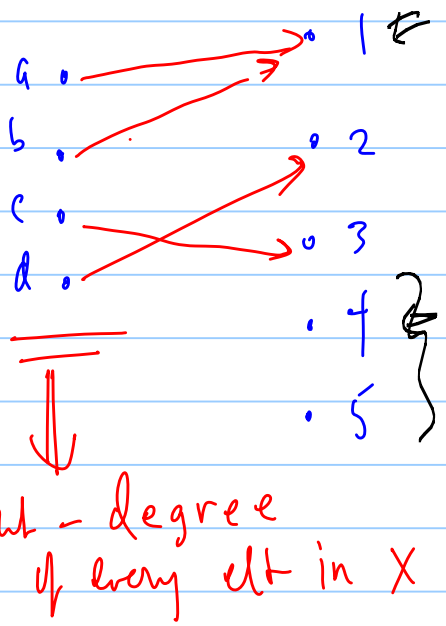
$f(x) = y \iff (x,y) \in f$.

X : domain of f

Y : target of f

$X = \{a, b, c, d\}$

$Y = \{1, 2, 3, 4, 5\}$



$f = \{(a,1), (b,1), (c,3), (d,2)\}$

out-degree of every elt in X is 1

$f: \mathbb{Z} \to \mathbb{Z}$
$f(x) = x^2 - 2$.

Ceiling + floor floor: $\mathbb{R} \to \mathbb{Z}$

floor(x) = largest integer y s.t. $y \leq x$.

$floor(x) = \lfloor x \rfloor$

$\lfloor 2.7 \rfloor = 2$

$\lfloor 3 \rfloor = 3$

$\lfloor -2.7 \rfloor = -3$

$\left\lfloor \frac{x}{12} \right\rfloor$

Ceiling (x) = Smallest int y s.t. $x \leq y$

Ceiling (x) = $\lceil x \rceil$

$\lceil 2.7 \rceil = 3$

$\lceil -2.7 \rceil = -2.$

$\lceil 3 \rceil = 3.$

$\left\lceil \frac{x}{6} \right\rceil$

$\to f: X \to Y$

A function f is one-to-one (1-1) if for every $x \neq x' \in X$

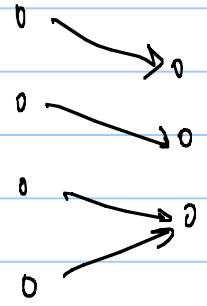
$x \neq x' \Rightarrow f(x) \neq f(x')$

$\Rightarrow$ Arrow diagram: in-degree of v's in $Y \leq 1$.

$\rightarrow f: X \to Y$

A function f is "onto" if $\forall y \in Y \; \exists x \in X$ s.t. $f(x) = y$.

$\Rightarrow$ Arrow diagram: in-degree of elts in Y is ≥ 1.



A function is a bijection (one-to-one correspondence) if it is 1-1 and onto.

$\hookrightarrow$ in-degs of elts in Y is $= 1$.

If there is a bijection f from A to B and if A is finite then. $|A| = |B|$.

Are there functions from $\mathbb{R}$ to $\mathbb{R}$?

$f(x) = 1/x$ X

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

function: Set of binary strings $\to \mathbb{Z}$.

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$f(s)$ is the position of ~~0~~ 0 in s.

the position of the first 0 in s.