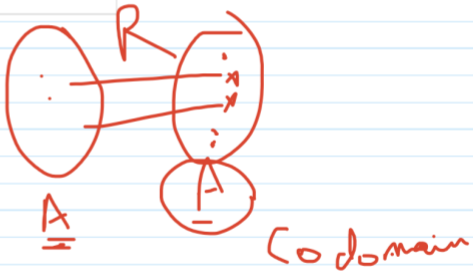
Relations - Examples

Ex- A = {1, 2, 3, 4, ..., 14}
R = {(x, y) : 3x - y = 0, x, y ∈ A}.
Write the Domain, Codomain, and Range of R.

$3x - y = 0$

$y = 3x$



Solution:
R = {(1,3), (2,6), (3,9), (4,12)}

(x, y)

$y = 3x$

$x, y \in A$

Domain = {1, 2, 3, 4}
Range = {3, 6, 9, 12}
Codomain = A = {1, 2, 3, 4, ..., 14}

Ex2:
R = {(x,y) : y = x + 5, x is natural no. less than 4; x, y ∈ N}.
Write in Roster form. Find Domain and range.

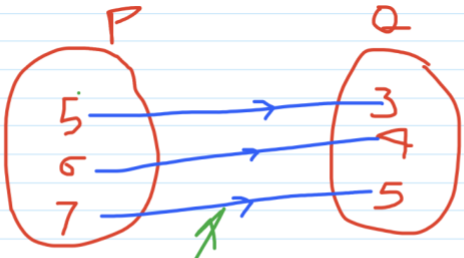
$x < 4$

Sol:
X = {1, 2, 3}
R = {(1, 6), (2, 7), (3, 8)} ✓
Domain = {1, 2, 3}
Range = {6, 7, 8}

Find inverse of R (R^{-1}) = Flip both the elements of each ordered pair (x,y) of R

R^{-1} = {(6,1), (7,2), (8,3)}

Ex-3:



Write the relation in
1. Set-builder form
2. Roster form
Find Domain and Range

$x \in P, y \in Q$

(x, y)

1. Set-builder:
   $R = \{(x,y) : y = x - 2, x \in \{5, 6, 7\}\}$
2. Roster form
   $R = \{(5,3), (6,4), (7,5)\}$

Domain: {5, 6, 7}
Range: {3, 4, 5}

Ex4-

$R = \{(x, x+5) : x \in \{0, 1, 2, 3, 4, 5\}\}$
$R = \{(x, y) : y = x + 5, x \in \{0, 1, 2, 3, 4, 5\}\}$
Domain & Range

Sol:
$R = \{(0, 5), (1,6), (2,7), (3,8), (4,9) (5,10)\}$
Domain = {0, 1, 2, 3, 4, 5}
Range = {5, 6, 7, 8, 9, 10}

Ex5 -
A = {1, 2, 3, 4, 6}
R is a relation on A
R = {(a,b) : a,b ∈ A, a divides b}
1. R in roster form
2. Domain of R
3. Range of R

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{1}{3}$ $\frac{b}{a} = 1$ $\frac{6}{3} = 2$ ✓

$\frac{6}{4} = \frac{3}{2} = 1.5$

Sol:
1. R = {(1,1), (1,2), (1,3), (1,4), (1,6),
   (2, 2), (2,4), (2,6), (3,3), (3,6),
   (4,4), (6,6)}
2. Domain = {1, 2, 3, 4, 6}
3. Range = {1, 2, 3, 4, 6}