CM 1606 Computational Mathematics

Tutorial No 02

1) Consider two sets $A=\{0,1,2,3,4,5\}$ and $B=\{0,1\}$. List all the ordered pairs for each relation defined below.

   $i)\alpha=\{(x,y)\mid x\in A, y\in B, x>y\}$
   $ii)\beta=\{(x,y)\mid x\in A, y\in B, x=y\}$
   $iii)\mu=\{(x,2)\mid x\in A, x\geq 2\}$
   $iv)\sigma=\{(x,y)\mid x\in A, y\in B, x+y>3\}$

2) Consider the relation $\alpha=\{(x,y)\mid x\in A, y\in B, x \textit{ divides } y\}$ where A = {2,3} and B = {4,9,12}. Find all the ordered pairs of α and α^{-1}.

3) Let $\alpha=\{(x,y)\mid x,y\in\mathbb{Z}, x^2+y^2=10\}$ and $\beta=\{(x,y)\mid x,y\in\mathbb{Z}, x-y=4\}$, then find $\alpha\cap\beta$

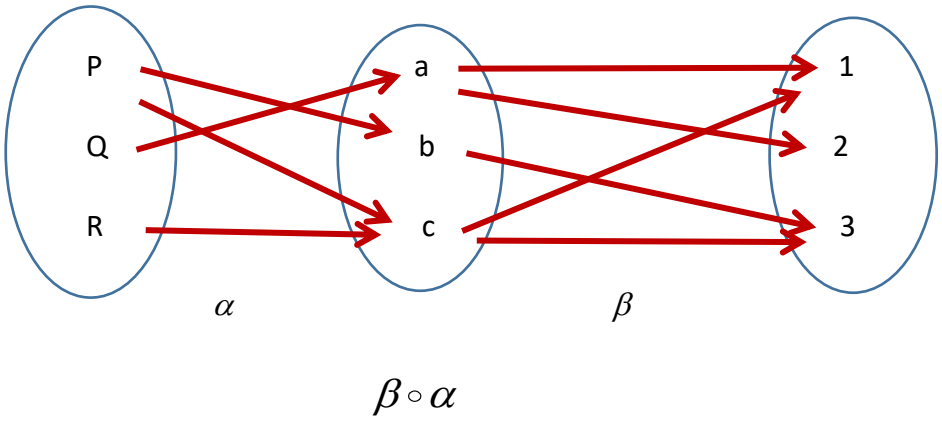
4) Consider the relation $\alpha=\{(x,y)\mid x,y\in A, x \textit{ divides } y\}$ defined on the set A = {2,4,7,8,9,3}. Find all the ordered pairs of α.

5) Find $\alpha\circ\beta$ and $\beta\circ\alpha$ for each case and complete the table. Establish the graphical representation of each composition.

α	β	$\alpha\circ\beta$	$\beta\circ\alpha$
$\alpha=\{(1,4),(2,4),(3,5)\}$	$\beta=\{(4,1),(5,3)\}$		
$\alpha=\{(5,6),(7,9),(8,3),(4,4)\}$	$\beta=\{(6,1),(9,9),(8,5),(6,12),(10,4)\}$		
$\alpha=\{(x,y)\mid x,y\in A, x<y\}$ Where A = {10,15,20,30}	$\beta=\{(x,y)\mid x,y\in A, n\in\mathbb{N}, x=ny\}$		
$\alpha=\{(a,a),(a,b),(b,c),(c,a),(c,c)\}$	$\beta=\{(a,b),(a,c),(b,a),(c,c)\}$		

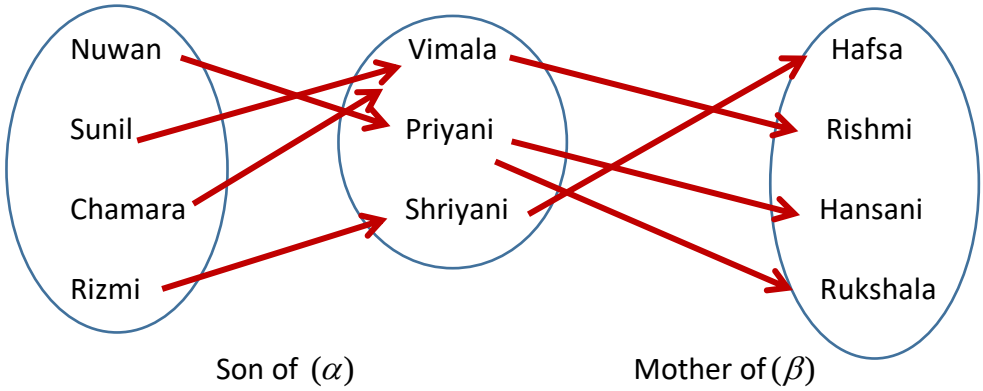
6) Consider the below relation for the composition $\beta \circ \alpha$. List all the ordered pairs of the composition $\beta \circ \alpha$ and, identify α and β separately.

i.



$\beta \circ \alpha$

ii.



a. Find children of each mother

b. Find $\beta \circ \alpha$ and interpret this relation

7) Identify meaningful real world two relations where both compositions $\alpha \circ \beta$ and $\beta \circ \alpha$ are meaningful.