

Quiz #6

Monday, November 6 2017

Duration: 25 min

NAME: _____

Please write clearly and properly.

Problem	Grade
1	
2	
Total	

Problem 1 (~ 8 points.).

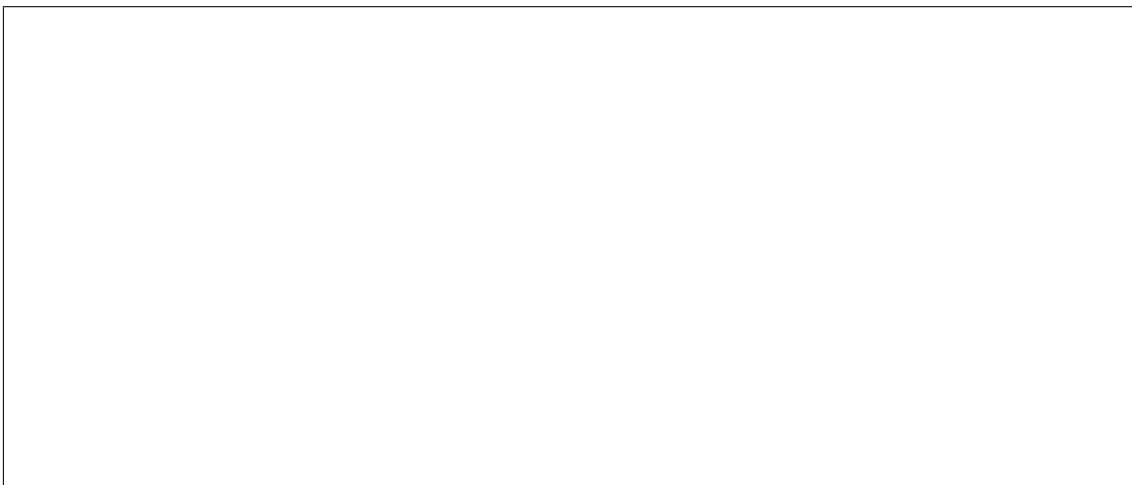
Consider the relation \mathcal{R} on the set $X = \{1, 2, 3\}$ defined by:

$$\mathcal{R} = \{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 2)\}$$

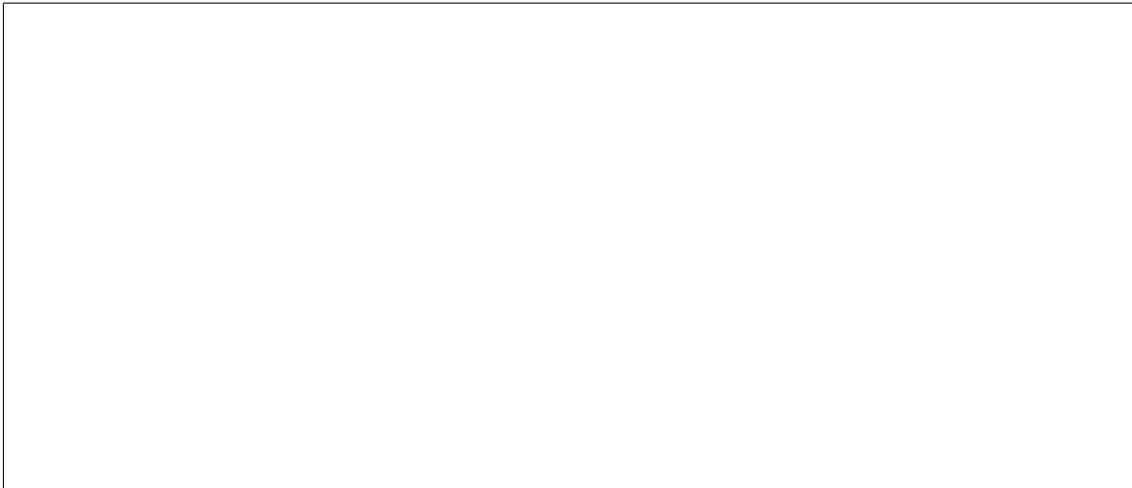
(1) Draw the digraph of this relation.



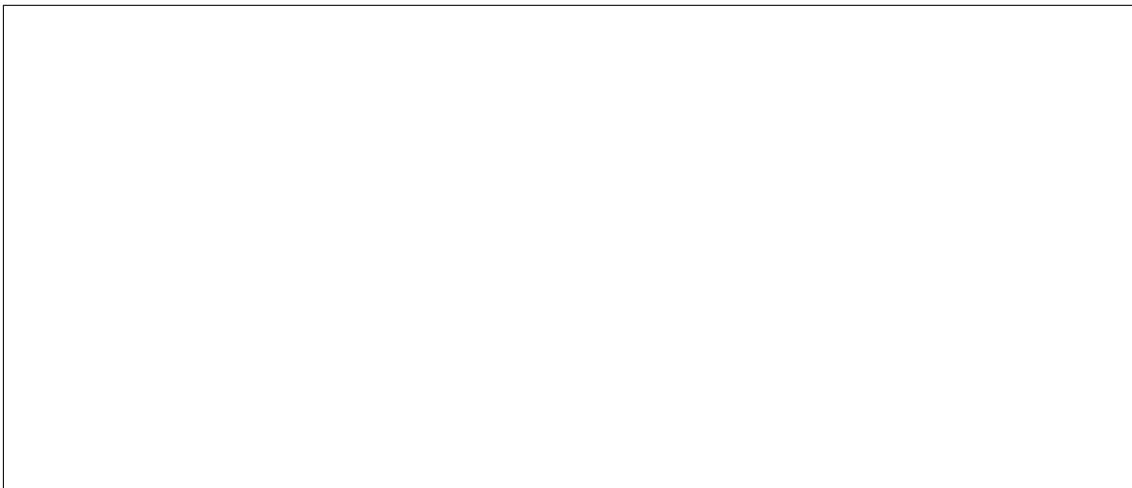
(2) Is this relation a function? Explain why or why not.



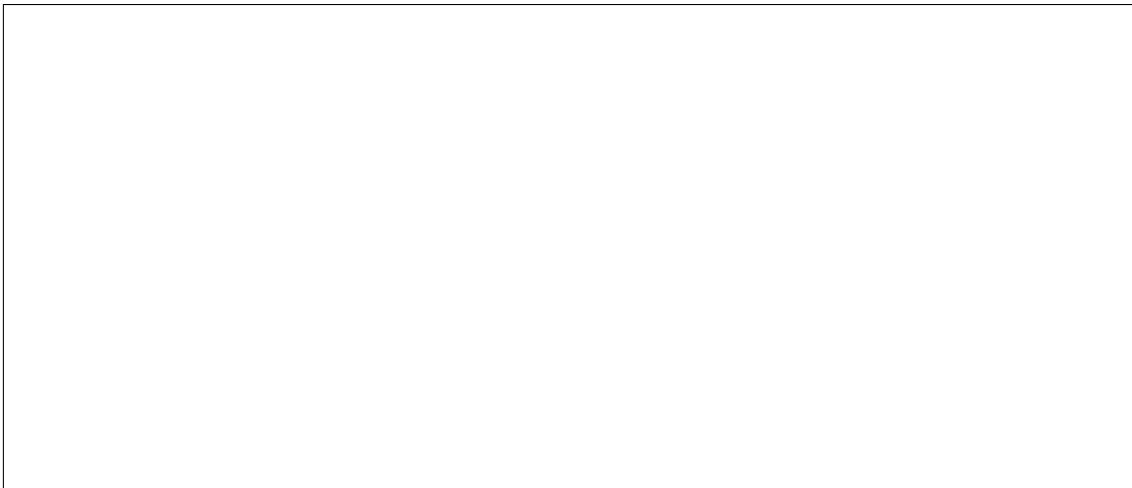
(3) Is this relation reflexive? Explain why or why not.



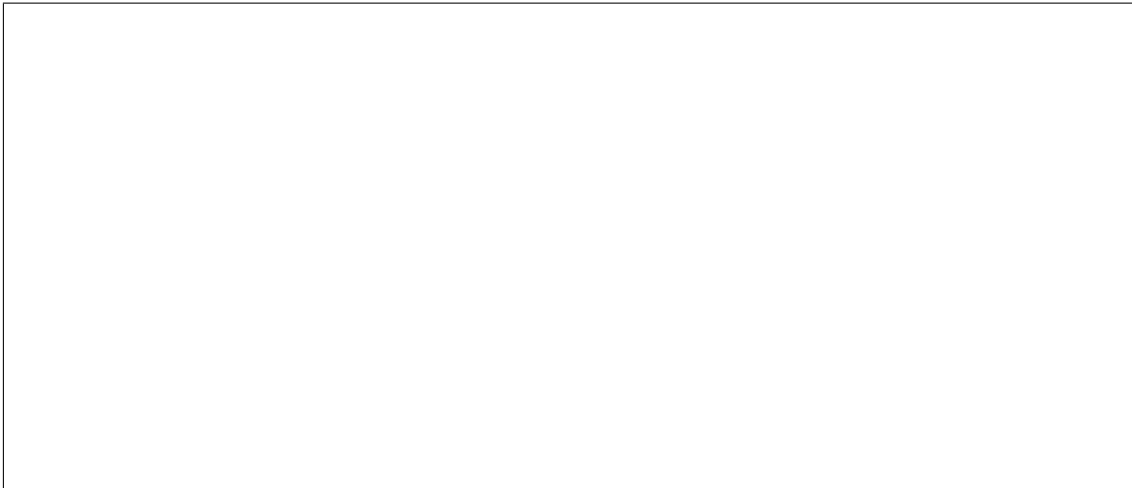
(4) Is this relation symmetric? Explain why or why not.



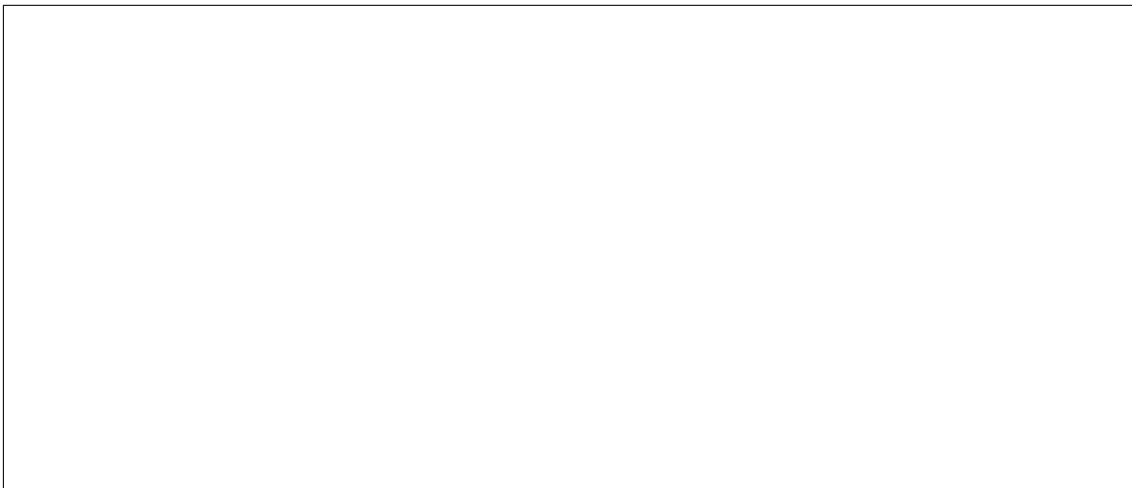
(5) Is this relation antisymmetric? Explain why or why not.



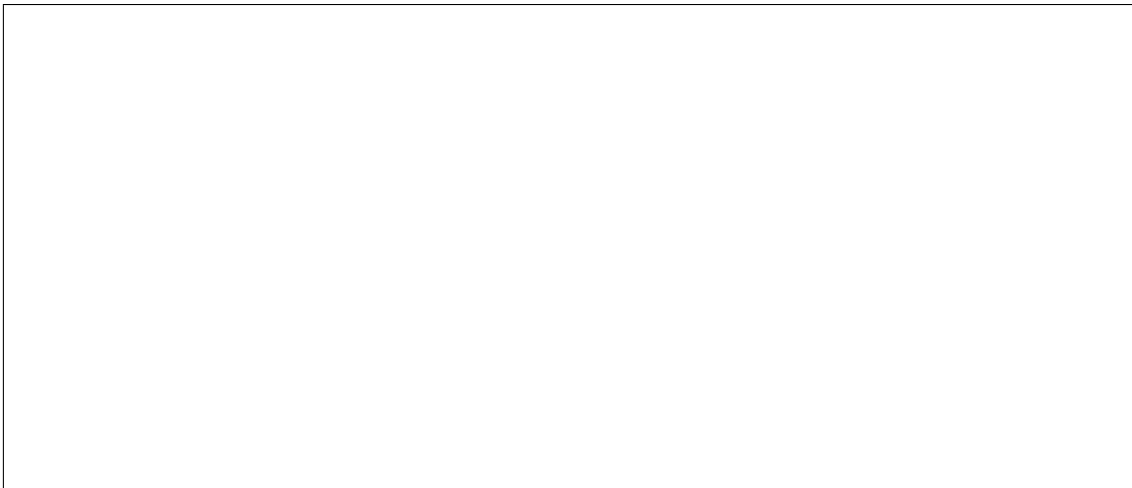
(6) Is this relation transitive? Explain why or why not.



(7) Is this relation a partial order? Explain why or why not.



(8) Is this relation an equivalence relation? Explain why or why not.



Problem 2 (~ 5 points.).

Consider the relation \mathcal{R} on the set $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ defined by:

$$x\mathcal{R}y \Leftrightarrow x = y \pmod{3} .$$

We recall that $x = y \pmod{3}$ means, by definition, that 3 divides $(x - y)$.

(1) Prove that \mathcal{R} is an equivalence relation.

(2) Find the equivalence class of each element of X . *No explanations required.*

(3) What is the partition of X associated with this equivalence relation? *No explanations required.*