MS121 Discrete Mathematics, Tutorial 4

1. Let $A = \{1, 2, 3\}$, $B = \{a, b, c, d\}$ and define the relation R from A to B by

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

Represent R (i) as a digraph and (ii) as a matrix.

2. Let R be the relation on $A = \{1, 2, 3, 4\}$ given by

$$R = \{(x, y) \mid 2x + 3y \text{ is even}\}.$$

Represent R (i) as a digraph and (ii) as a matrix.

3. Is the relation in Q2 reflexive? Is the relation in Q2 symmetric? Is the relation in Q2 antisymmetric? Is the relation in Q2 transitive?

4. Let R be the relation on $A = \{1, 2, 3, 4, 5, 6\}$ given by

$$R = \{(1, 1), (1, 4), (1, 5), (2, 2), (2, 5), (2, 6), (3, 3), (3, 4), (3, 6), (4, 4), (5, 5), (6, 6)\}.$$

Represent R as a digraph.

5. Is the relation in Q4 reflexive? Is the relation in Q4 symmetric? Is the relation in Q4 antisymmetric? Is the relation in Q4 transitive?

MS121 Discrete Mathematics, Tutorial 4 hints

1. Digraph has vertex set given by $A \cup B$ and an edge from a to b if $(a, b) \in R$. Matrix is an array and has rows labelled by A and columns labelled by B.

2. Digraph has vertex set A, not two copies of A. Matrix has rows and columns both labelled by A.

3. Find the definitions of these properties of a relation on a single set.

4. As in Q2 the digraph has vertex set A.

5. Find the definitions of these properties of a relation on a single set.