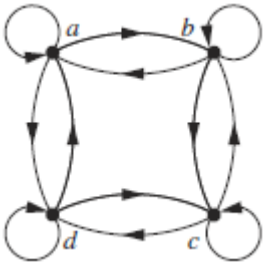
UCS405 (Discrete Mathematical Structures)

Tutorial Sheet-7 (Relations)

1. Which of these relations on {0, 1, 2, 3} are equivalence relations?
   a) {(0, 0), (1, 1), (2, 2), (3, 3)}
   b) {(0, 0), (0, 2), (2, 0), (2, 2), (2, 3), (3, 2), (3, 3)}
   c) {(0, 0), (1, 1), (1, 2), (2, 1), (2, 2), (3, 3)}
   d) {(0, 0), (1, 1), (1, 3), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3)}
   e) {(0, 0), (0, 1), (0, 2), (1, 0), (1, 1), (1, 2), (2, 0), (2, 2), (3, 3)}

2. Determine whether the relation with the directed graph is an equivalence relation or not?



3. Determine whether the relation represented by the given zero–one matrices is equivalence relation or not.

$$\begin{bmatrix} 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$