

Answer any five questions.

1. Let $A = \{1, 2, 3\}$ and $B = \{8, 9\}$.

Find whether the following subsets of $A \times B$ are ~~functions~~ ^{functions} from A to B .

(i) $f_1 = \{(1, 8), (1, 9), (2, 8), (3, 9)\}$.

(ii) $f_2 = \{(1, 9), (2, 9), (3, 9)\}$.

2. Check whether the following operations $*$ on S is binary
 $S = \mathbb{R}^+$; $*(a, b) = a + \log b$

3. If a groupoid (S, \circ) contains an identity element, then show that it is unique.

4. Let a, b, c be arbitrary elements of a group $(G, *)$. If $a * b = a * c$ then $b = c$.

5. Find the characteristic equation of the matrix $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$.

6. Calculate $(123)_{10} = (?)_8$.

7. For two independent events A and B , prove that
 $P(A \cup B) = 1 - P(A^c) \cdot P(B^c)$.