

Relations

1. Consider the following relations :

$R = \{(x, y) \mid x, y \text{ are real numbers and } x = wy \text{ for some rational number } w\}$;

$$S = \left\{ \left(\frac{m}{n}, \frac{p}{q} \right) \middle| m, n, p \text{ and } q \text{ are integers such that } n, q \neq 0 \text{ and } qm = pn \right\}$$

Then [AIEEE-2010]

- (1) R is an equivalence relation but S is not an equivalence relation
(2) Neither R nor S is an equivalence relation
(3) S is an equivalence relation but R is not an equivalence relation
(4) R and S both are equivalence relations
2. If $R = \{(x, y) ; x, y \in Z, x^2 + 3y^2 \leq 8\}$ is a relation on the set of integers Z , then the domain of R^{-1} is [JEE (Main)-2020]

(1) $\{0, 1\}$

(2) $\{-2, -1, 1, 2\}$

(3) $\{-1, 0, 1\}$

(4) $\{-2, -1, 0, 1, 2\}$

3. Let R_1 and R_2 be two relation defined as follows :

$R_1 = \{(a, b) \in R^2 : a^2 + b^2 \in Q\}$ and

$R_2 = \{(a, b) \in R^2 : a^2 + b^2 \in Q\}$, where Q is the set of all rational numbers. Then

[JEE (Main)-2020]

- (1) Neither R_1 nor R_2 is transitive.
(2) R_2 is transitive but R_1 is not transitive.
(3) R_1 and R_2 are both transitive.
(4) R_1 is transitive but R_2 is not transitive.