

# Groups-2

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1. Which of the following is/are true?

- i. In a group  $(G, *)$  with an identity element 'e', if  $a * a = a$  then  $a = e$
- ii. In a group  $(G, *)$  if  $x^{-1} = x \ \forall x \in G$ , then  $G$  is an abelian group
- iii. In a group  $(G, *)$ , if  $(a * b)^2 = a^2 * b^2 \ \forall a, b \in G$ , then  $G$  is an abelian group

2. If  $A = \{1, 3, 5, 7, \dots, \infty\}$  and  $B = \{2, 4, 6, 8, \dots, \infty\}$  which of the following is a semi-group?

- i.  $(A, +)$
- ii.  $(A, .)$
- iii.  $(B, +)$
- iv.  $(B, .)$

3. Let  $A$  = set of all the rational numbers and a binary operation  $*$  is defined as  $(a*b) = ab/3 \forall a, b \in A$ , then which of the following are true?

- I.  $(A, *)$  is a group
- II. The identity element of  $A$  w.r.t  $*$  is 3
- III. The inverse of ' $a$ ' is  $3/a \forall a \in A$

4. Let  $A = \{1, 2, 3, 4, \dots, \infty\}$  and a binary operation  $*$  is defined by  $a*b = a^b \forall a, b \in A$ , then which of the following are true?

- I.  $(A, *)$  is a semi-group but not monoid
- II.  $(A, *)$  is a monoid but not a group
- III.  $(A, *)$  is a group
- IV.  $(A, *)$  is not a semi-group

5. Let  $A = \{x \mid 0 < x \leq 1 \text{ and } x \text{ is a real number}\}$   
then 'A' w.r.t multiplication is
- I. A semi-group but not monoid
  - II. A monoid but not a group
  - III. A group
  - IV. Not a semi-group