EXERCISE 14.3 PAGE NO: 334

1. For each of the following compound statements first identify the connecting words and then break it into component statements.
(i) All rational numbers are real and all real numbers are not complex.
(ii) Square of an integer is positive or negative.
(iii) The sand heats up quickly in the Sun and does not cool down fast at night.
(iv) $x = 2$ and $x = 3$ are the roots of the equation $3x^2 – x – 10 = 0$.
Solution:
(i) In this sentence ‘and’ is the connecting word
The component statements are as follows
(a) All rational numbers are real
(b) All real numbers are not complex
(ii) In this sentence ‘or’ is the connecting word
The component statements are as follows
(a) Square of an integer is positive
(b) Square of an integer is negative
(iii) In this sentence ‘and’ is the connecting word
The component statements are as follows
(a) The sand heats up quickly in the Sun
(b) The sand does not cool down fast at night
(iv) In this sentence ‘and’ is the connecting word
The component statements are as follows
(a) $x = 2$ is the root of the equation $3x^2 – x – 10 = 0$
(b) $x = 3$ is the root of the equation $3x^2 – x – 10 = 0$

2. Identify the quantifier in the following statements and write the negation of the statements.
(i) There exists a number which is equal to its square.
(ii) For every real number x, x is less than $x + 1$.
(iii) There exists a capital for every state in India.
Solution:
(i) Here, the quantifier is ‘there exists’.
The negation of this statement is as follows
There does not exists a number which is equal to its square
(ii) Here, the quantifier is ‘for every’.
The negation of this statement is as follows
There exist a real number x, such that x is not less than x + 1
(iii) Here, the quantifier is ‘there exists’.
The negation of this statement is as follows

In India there exists a state, which does not have a capital.

3. Check whether the following pair of statements is negation of each other. Give reasons for the answer.
(i) $x + y = y + x$ is true for every real numbers x and y.
(ii) There exists real number x and y for which $x + y = y + x$.
Solution:
The negation of (i) statement is given below
There exists real number x and y for which $x + y \neq y + x$
Now, this statement is not same as (ii) statement
Hence, the given statements are not the negation of each other

4. State whether the "Or" used in the following statements is "exclusive "or" inclusive. Give reasons for your answer.
(i) Sun rises or Moon sets.
(ii) To apply for a driving licence, you should have a ration card or a passport.
(iii) All integers are positive or negative.
Solution:
(i) It is not possible for the Sun to rise and the Moon to set together. Hence, the 'or' in the given statement is exclusive.
(ii) Since a person can have both a ration card and a passport to apply for a driving license. Hence, the 'or' in the given statement is inclusive.
(iii) Since all integers cannot be both positive and negative. Hence, the 'or' in the given statement is exclusive.