EXERCISE 31.2

Write the negation of the following statement:
(i) Bangalore is the capital of Karnataka.
(ii) It rained on July 4, 2005.
(iii) Ravish is honest.
(iv) The earth is round.
(v) The sun is cold.
Solution:
(i) Bangalore is the capital of Karnataka.
The negation of the statement is:
It is false that "Bangalore is the capital of Karnataka."
Or
"Bangalore is not the capital of Karnataka."

(ii) It rained on July 4, 2005.
The negation of the statement is:
It is false that "It rained on July 4, 2005".
Or
"It did not rain on July 4, 2005".

(iii) Ravish is honest.
The negation of the statement is:
It is false that "Ravish is honest."
Or
"Ravish is not honest."

(iv) The earth is round.
The negation of the statement is:
It is false that "The earth is round."
Or
"The earth is not round."

(v) The sun is cold.
The negation of the statement is:
It is false that "The sun is cold."
Or
"The sun is not cold."

2. (i) All birds sing.
(ii) Some even integers are prime.
(iii) There is a complex number which is not a real number.
(iv) I will not go to school.
(v) Both the diagonals of a rectangle have the same length.
(vi) All policemen are thieves.
Solution:
(i) All birds sing.
The negation of the statement is:
It is false that "All birds sing."
Or
"All birds do not sing."

(ii) Some even integers are prime.
The negation of the statement is:
It is false that "even integers are prime."
Or
"Not every even integers is prime."

(iii) There is a complex number which is not a real number.
The negation of the statement is:
It is false that "complex numbers are not a real number."
Or
"All complex number are real numbers."

(iv) I will not go to school.
The negation of the statement is:
"I will go to school."

(v) Both the diagonals of a rectangle have the same length.
The negation of the statement is:
"There is at least one rectangle whose both diagonals do not have the same length."

(vi) All policemen are thieves.
The negation of the statement is:
"No policemen are thief".

3. Are the following pairs of statements are a negation of each other:
(i) The number x is not a rational number.

The number x is not an irrational number.
(ii) The number x is not a rational number.
The number x is an irrational number.
Solution:
(i) The number x is not a rational number.
"The number x is an irrational number."
Since, the statement "The number x is not a rational number." Is a negation of the first statement.

(ii) The number x is not a rational number.
"The number x is an irrational number."
Since, the statement "The number x is a rational number." Is not a negation of the first statement.

4. Write the negation of the following statements:
(i) p: For every positive real number x, the number (x – 1) is also positive.
(ii) q: For every real number x, either x > 1 or x < 1.
(iii) r: There exists a number x such that 0 < x < 1.
Solution:
(i) p : For every positive real number x, the number (x – 1) is also positive.
The negation of the statement:
p: For every positive real number x, the number (x – 1) is also positive.
is
~p: There exists a positive real number x, such that the number (x – 1) is not positive.

(ii) q: For every real number x, either $x > 1$ or $x < 1$.
The negation of the statement:
q: For every real number x, either $x > 1$ or $x < 1$.
is
~q: There exists a real number such that neither $x>1$ or $x<1$.

(iii) r: There exists a number x such that $0 < x < 1$.
The negation of the statement:
r: There exists a number x such that $0 < x < 1$.
is
~r: For every real number x, either $x \leq 0$ or $x \geq 1$.

5. Check whether the following pair of statements is a negation of each other. Give reasons for your answer.

(i) a + b = b + a is true for every real number a and b.
(ii) There exist real numbers a and b for which a + b = b + a.
Solution:
The negation of the statement:
p: a + b = b + a is a true for every real number a and b.
is
~p: There exist real numbers are ‘a’ and ‘b’ for which a+b ≠ b+a.
So, the given statement is not the negation of the first statement.