Exercise 4(A)

1. State, true or false:

(i) $x < -y \Rightarrow -x > y$

(ii) $-5x \geq 15 \Rightarrow x \geq -3$

(iii) $2x \leq -7 \Rightarrow 2x/-4 \geq -7/-4$

(iv) $7 > 4 \Rightarrow 1/7 < 1/5$

Solution:

(i) Given statement is true. (according to Rule 5)
(ii) Given statement is false. (according to Rule 4)
(iii) Given statement is true. (according to Rule 4)
(iv) Given statement is true. (according to Rule 6)

2. State whether the following statements are true or false.

(i) $a < b$, then $a - c < b - c$

(ii) If $a > b$, then $a + c > b + c$

(iii) If $a < b$, then $ac > bc$

(iv) If $a > b$, then $a/c < b/c$

(v) If $a - c > b - d$, then $a + d > b + c$

(vi) If $a < b$, and $c > 0$, then $a - c > b - c$

Where a, b, c and d are real numbers and $c \neq 0$.

Solution:

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(i) Given statement is true. (Subtracting equals on both sides will not change the inequality)
(ii) Given statement is true. (Adding equals on both sides will not change the inequality)
(iii) Given statement is false. (According to rule 3)
(iv) Given statement is false. (According to rule 3)
(v) Given statement is true. As $a - c > b - d \Rightarrow a + d > b + c$
(vi) Given statement is false. As $a < b$, $a - c < b - c$ (since $c > 0$)

3. If $x \in N$, find the solution set of inequations.

(i) $5x + 3 \leq 2x + 18$

(ii) $3x - 2 < 19 - 4x$

Solution:

(i) $5x + 3 \leq 2x + 18$
$5x - 2x \leq 18 - 3$
$3x \leq 15$
$x \leq 5$

As, $x \in N$, thus the solution set is $\{1, 2, 3, 4, 5\}$.

(ii) $3x - 2 < 19 - 4x$
$3x + 4x < 19 + 2$
$7x < 21$
$x < 3$

As, x ∈ N, thus the solution set is {1, 2}.

4. If the replacement set is the set of whole numbers, solve:
(i) x + 7 ≤ 11
(ii) 3x - 1 > 8
(iii) 8 - x > 5
(iv) 7 - 3x ≥ -1/2
(v) x – 3/2 < 3/2 - x
(vi) 18 ≤ 3x - 2
Solution:

(i) $x + 7 \leq 11$
$x \leq 11 - 7$
$x \leq 4$
As the replacement set = W (set of whole numbers)
Therefore, the solution set = {0, 1, 2, 3, 4}

(ii) $3x - 1 > 8$
$3x > 8 + 1$
$x > 3$
As the replacement set = W (set of whole numbers)
Therefore, the solution set = {4, 5, 6, …}

(iii) $8 - x > 5$
$- x > 5 - 8$
$- x > -3$
$x < 3$
As the replacement set = W (set of whole numbers)
Therefore, the solution set = {0, 1, 2}

(iv) $7 - 3x \geq -1/2$
$-3x \geq -1/2 - 7$
$-3x \geq -15/2$
$x \geq 5/2$
As the replacement set = W (set of whole numbers)
Therefore, the solution set = {0, 1, 2}

(v) $x – 3/2 < 3/2 - x$
$x + x < \frac{3}{2} + \frac{3}{2}$
$2x < 3$
$x < \frac{3}{2}$
As the replacement set = W (set of whole numbers)
Therefore, the solution set = {0, 1}

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(vi) $18 \leq 3x - 2$
$18 + 2 \leq 3x$
$20 \leq 3x$
$x \geq 20/3$
As the replacement set = W (set of whole numbers)
Therefore, the solution set = {7, 8, 9, …}

5. Solve the inequation:
$3 - 2x \geq x - 12$ given that $x \in N$.
Solution:

$3 - 2x \geq x - 12$
$-2x - x \geq -12 - 3$
$-3x \geq -15$
$x \leq 5$
As, $x \in N$,
Thus, the solution set = {1, 2, 3, 4, 5}

6. If $25 - 4x \leq 16$, find:
(i) the smallest value of x, when x is a real number,
(ii) the smallest value of x, when x is an integer.
Solution:

$25 - 4x \leq 16$
$-4x \leq 16 - 25$
$-4x \leq -9$
$x \geq 9/4$
$x \geq 2.25$
Now,
(i) The smallest value of x, when x is a real number is 2.25.
(ii) The smallest value of x, when x is an integer is 3.

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