

REG-INEQ-2223-ASM-SET 1-MATH**Suggested solutions****Multiple Choice Questions**

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|-------|-------|-------|-------|-------|
| 1. D | 2. B | 3. C | 4. D | 5. A |
| 6. A | 7. C | 8. D | 9. B | 10. D |
| 11. C | 12. A | 13. C | 14. B | 15. B |
| 16. A | 17. D | 18. A | 19. B | 20. B |
| 21. C | 22. A | 23. C | 24. A | |

1. D

$$4x - 8 < 0 \quad \text{or} \quad 3 - 2x > -3x + 2$$

$$x < 2 \qquad x > -1$$

Thus, x can be any real number.

2. B

$$\frac{5-x}{2} > 4 \quad \text{or} \quad \frac{5x+2}{3} \leq -3$$

$$5-x > 8 \qquad 5x+2 \leq -9$$

$$x < -3 \qquad x \leq -\frac{11}{5}$$

Thus, we have $x < -\frac{11}{5}$.

The maximum integral value of x is -3 .

3. C

$$-7x < 28 \quad \text{and} \quad 28 < 4x$$

$$x > -4 \qquad x > 7$$

Thus, $x > 7$.

4. D

$$6-x < 2x-3 \quad \text{or} \quad 7-3x > 1$$

$$x > 3 \qquad x < 2$$

Thus, $x < 2$ or $x > 3$.

5. A

The inequalities become $x > 6$ or $x > 2$.

Thus, $x > 2$.

6. A

$$3y - 5 < 5y + 1 \quad \text{and} \quad 5y + 1 \leq 11$$

$$-2y < 6 \qquad 5y \leq 10$$

$$y > -3 \qquad y \leq 2$$

Thus, $-3 < y \leq 2$.

7. C

$$\frac{3x+1}{2} < x-1 \quad \text{and} \quad 4x-5 > 7x+1$$

$$x < -3 \qquad x < -2$$

Thus, $x < -3$.

8. D

The inequalities can be reduced to $x > 2$ and $x < 6$.

Thus, $2 < x < 6$. There are 3 integers satisfying the compound inequality: 3, 4 and 5.

9. B

$$2(x-3) > 6-x \quad \text{and} \quad -\frac{x}{3} \leq -5$$

$$x > 4 \qquad x \geq 15$$

Thus, $x \geq 15$.

Required number is 15.

10. D

$$1 < \log a + 2 \log b \quad \text{and} \quad \log a + 2 \log b < 2$$

$$1 < \log ab^2 \qquad \log ab^2 < 2$$

$$ab^2 > 10 \qquad ab^2 < 10^2$$

Thus, we have $10 < ab^2 < 100$.

11. C

$$\frac{1-x}{-3} < 3x-2 \quad \text{and} \quad 3x-2 \leq 5$$

$$x > \frac{5}{8} \qquad x \leq \frac{7}{3}$$

Thus, $\frac{5}{8} < x \leq \frac{7}{3}$.

12. A

$$2x > 3 \quad \text{or} \quad \frac{2x-5}{-3} > 1-x$$

$$x > \frac{3}{2} \qquad x > -2$$

Thus, $x > -2$.

13. C

The inequalities become $x \leq 7$ or $x < -6$.

Thus, $x \leq 7$.

The greatest integer is 7.

14. B

The inequalities can be reduced to $x > 4$ or $x > 3$.

So, $x > 3$.

15. B

$$ax + 4 > 0 \quad \text{or} \quad -bx - 1 < 3$$

$$ax > -4 \quad \quad \quad -bx < 4$$

$$x < -\frac{4}{a} \quad \quad \quad x < -\frac{4}{b}$$

Since $a < b < 0$, we have $-\frac{4}{b} > -\frac{4}{a} > 0$.

Thus, we have $x < -\frac{4}{b}$.

16. A

$$11 - 2x < 13 \quad \text{and} \quad \frac{x}{2} + 1 > \frac{x}{4}$$

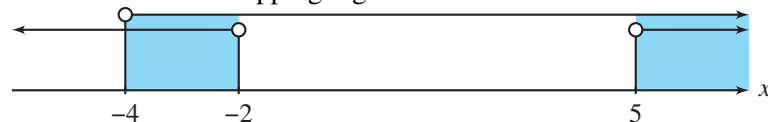
$$x > -1 \quad \quad \quad \frac{x}{4} > -1$$

$$x > -4$$

Therefore, $x > -4$.

17. D

Solution is the overlapping region of the arrows.



18. A

$$2(x - 3) < \frac{3x + 1}{2} \quad \text{and} \quad \frac{3x + 1}{2} \leq 6$$

$$\frac{x}{2} < \frac{13}{2} \quad \quad \quad \frac{3x}{2} \leq \frac{11}{2}$$

$$x < 13 \quad \quad \quad x \leq \frac{11}{3}$$

Thus, $x \leq \frac{11}{3}$.

There are 3 positive integers satisfying the compound inequality.

19. B

$$3 > 4 - x \quad \text{and} \quad 1 - \frac{6 - x}{2} > -1$$

$$x > 1 \quad \quad \quad x > 2$$

Thus, $x > 2$.

20. B

Required range is $x > -\frac{1}{3}$.

21. C

$$3x - \frac{1-x}{2} + a > 0 \quad \text{and} \quad 2x - 6 > 0$$

$$\frac{7x}{2} > \frac{1}{2} - a \quad x > 3$$

$$x > \frac{1}{7} - \frac{2a}{7}$$

Thus, $\frac{1}{7} - \frac{2a}{7} = -3$. So, $a = 11$

22. A

$$3x - 1 > 5 \quad \text{or} \quad 3 - 2x < 5$$

$$x > 2 \quad x > -1$$

Thus, $x > -1$.

23. C

The inequalities become $x < \frac{1}{4}$ and $x \leq -\frac{1}{6}$.

Thus, $x \leq -\frac{1}{6}$.

The greatest value of x is -1 .

24. A

$$2x - 1 \geq 5 \quad \text{and} \quad \frac{1-3x}{4} < 2-x$$

$$x \geq 3 \quad x < 7$$

Thus, $3 \leq x < 7$.

There are 4 integers satisfying both inequalities.

Conventional Questions

25. (a) $\frac{4x+5}{2} \geq 3(x-1)$
 $-x \geq -\frac{11}{2}$
 $x \leq \frac{11}{2}$ 1A
 $2x - 10 < 0$
 $x < 5$ 1A
 Therefore, $x < 5$. 1M
- (b) 4 1A
26. (a) $\frac{3x-2}{5} \geq -5(x+4)$
 $x \geq -\frac{7}{2}$ 1A
 $-3x < 15$
 $x > -5$ 1A
 Thus, $x \geq -\frac{7}{2}$. 1M
- (b) $-3, -2$ and -1 1A
27. (a) $\frac{1-x}{2} < x-1$
 $-\frac{3x}{2} < -\frac{3}{2}$
 $x > 1$ 1A
- (b) $9 - 3x > 0$
 $x < 3$ 1A
 Thus, $1 < x < 3$.
 Required integer is 2. 1A
28. (a) $-3(x-4) \geq \frac{5x+3}{6}$
 $-\frac{23x}{6} \geq -\frac{23}{2}$
 $x \leq 3$ 1A
- (b) $6x + 24 > 0$
 $x > -4$ 1A
 So, $-4 < x \leq 3$. 1M
 There are 7 integers. 1A

29. (a) $\frac{3x-7}{4} < 2x+5$

$$-\frac{5x}{4} < \frac{27}{4}$$

$$x > -\frac{27}{5}$$

1A

$$x+2 \geq 0$$

$$x \geq -2$$

$$\text{Thus, } x > -\frac{27}{5}.$$

1M

(b) $4x+13 < 9$

$$x < -1$$

1A

$$\text{Thus, } -\frac{27}{5} < x < -1.$$

1M

$$\text{Required sum} = (-5) + (-4) + (-3) + (-2) = -14$$

1A

30. $x < \frac{3x+2}{2}$

$$-\frac{x}{2} < 1$$

$$x > -2$$

1A

$$7x-3 \leq 4(3+x)$$

$$3x \leq 15$$

$$x \leq 5$$

1A

$$\text{Thus, } -2 < x \leq 5.$$

1M

$$\text{Required integer is } -1.$$

1A