REG-INEQ-2324-ASM-SET 1-MATH
Suggested solutions

Multiple Choice Questions

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

$4x - 8 < 0$ or $3 - 2x > -3x + 2$

$x < 2$ $x > -1$

Thus, x can be any real number.

2. B

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

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

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

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

The maximum integral value of x is -3.

3. C

$-7x < 28$ and $28 < 4x$

$x > -4$ $x > 7$

Thus, $x > 7$.

4. D

$6 - x < 2x - 3$ or $7 - 3x > 1$

$x > 3$ $x < 2$

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

5. A

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

Thus, $x > 2$.

6. A

$3y - 5 < 5y + 1$ and $5y + 1 \leq 11$

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

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

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

7. C

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

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

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

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

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

Thus, $x \geq 15$.

Required number is 15.

10. D

$1 < \log a + 2\log b$ and $\log a + 2\log b < 2$

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

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

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

11. C

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

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

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

12. A

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

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

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

$ax + 4 > 0$ or $-bx - 1 < 3$

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

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

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

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

16. A

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

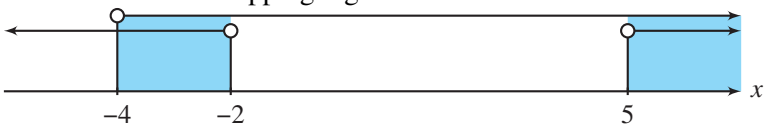
$x > -1$ $\qquad \frac{x}{4} > -1$

$x > -4$

Therefore, $x > -4$.

17. D

Solution is the overlapping region of the arrows.



18. A

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

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

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

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

There are 3 positive integers satisfying the compound inequality.

19. B

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

$x > 1$ $\qquad x > 2$

Thus, $x > 2$.

20. B

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

21. C

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

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

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

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

22. A

$3x - 1 > 5$ or $3 - 2x < 5$

$x > 2$ $x > -1$

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

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

$x \geq 3$ $x < 7$

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) $\dfrac{3x-7}{4} < 2x+5$

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

$x > -\dfrac{27}{5}$ 1A

$x+2 \geq 0$

$x \geq -2$

Thus, $x > -\dfrac{27}{5}$. 1M

(b) $4x+13 < 9$

$x < -1$ 1A

Thus, $-\dfrac{27}{5} < x < -1$. 1M

Required sum = $(-5)+(-4)+(-3)+(-2) = -14$ 1A

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

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

$x > -2$ 1A

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

$3x \leq 15$

$x \leq 5$ 1A

Thus, $-2 < x \leq 5$. 1M

Required integer is -1. 1A