SUM-LP-2425-ASM-SET 1-MATH
Suggested solutions

Multiple Choice Questions

1. D	2. D	3. C	4. A	5. A
6. C	7. B	8. C	9. B	10. B
11. C	12. D	13. B	14. C	15. B
16. B	17. A	18. C	19. C	20. A
21. A	22. B	23. D	24. C	25. A
26. C	27. D	28. B	29. D	30. C

1. D

$x \leq y - 2$ and $x \leq y - 2$

$x \leq \ldots$ $y \geq \ldots$

The shaded region is on the left and above the straight line $x = y - 2$.

The answer is D.

2. D

Take $a = 1$, $b = 1$ and $c = -1$.

$x + y - 1 \leq 0$ and $x + y - 1 \leq 0$

$x \leq \ldots$ $y \leq \ldots$

The solution region lies on the left and below the straight line $ax + by + c = 0$.

The answer is D.

3. C

Take $m = 1$ and $c = 1$.

$y < x + 1$ and $y < x + 1$

$y < \ldots$ $x > \ldots$

The solution region lies on the right and below the line $y = mx + c$.

The answer is C.

4. A

Take $b = -1$ and $c = -1$.

$$x - y - 1 \leq 0 \quad \text{and} \quad x - y - 1 \leq 0$$
$$x \leq \ldots \qquad\qquad y \geq \ldots$$

The solution region lies on the left and above the straight line $x - y - 1 = 0$.
y-intercept $= -1 < 0$
The answer is A.

5. A

$3x \geq 2y$: on the right of straight line $3x = 2y$
$3x + 2y \leq 12$: on the left of straight line $3x + 2y = 12$
$0 \leq x \leq 4$: between straight lines $x = 0$ and $x = 4$
$0 \leq y \leq 6$: between straight lines $y = 0$ and $y = 6$
The answer is A.

6. C

$x \leq 2$: on the left of straight line $x = 2$
$x + y \geq 2$: on the right of straight line $x + y = 2$
$x - y \geq 0$: on the right of straight line $x - y = 0$
The answer is C.

7. B

$x + 2y \leq 7$: on the left of straight lines $x + 2y = 7$
$x \geq 3$: on the right of straight line $x = 3$
$y \geq 0$: above straight line $y = 0$
The answer is B.

8. C

$x \leq 4$: on the left of straight line $x = 4$
$x + y \geq 4$: on the right of straight line $x + y = 4$
$x - y \geq 0$: on the right of straight line $x - y = 0$
The answer is C.

9. B

Compute the intercepts of all corresponding straight lines.

Line	x-intercept	y-intercept
$x + y = 4$	4	4
$3x + 2y = 6$	2	3
$x = y$	0	0

$x + y \leq 4$: on the left of the straight line $x + y = 4$

$3x + 2y \geq 6$: on the right of the straight line $3x + 2y = 6$

$x \leq y$: on the left of the straight line $x = y$

$x \geq 0$: on the right of the y-axis

$y \geq 0$: above the x-axis

The answer is B.

10. B

The corresponding system of inequalities is

$$\begin{cases} x \geq y + 1 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

$x \geq y + 1$: on the right of the straight line $y = x - 1$

$x \geq 0$: on the right of the y-axis

$y \geq 0$: above the x-axis

The answer is B.

11. C

$3x - 4y + 12 \geq 0$: on the right of straight line $3x - 4y + 12 = 0$

$x + 3y - 12 \leq 0$: on the left of straight line $x + 3y - 12 = 0$

$x \geq 0$: on the right of straight line $x = 0$

The answer is C.

12. D

$0 \leq x \leq 2$: between straight lines $x = 0$ and $x = 2$

$x + y \leq 8$: on the left of straight line $x + y = 8$

$3x + 8y \geq 24$: on the right of straight line $3x + 8y = 24$

13. B

$-2 \le x \le 2$: between straight lines $x = -2$ and $x = 2$

$x + y \le 2$: on the left of straight line $x + y = 2$

$y \ge 0$: above straight line $y = 0$

The answer is B.

14. C

$3x - y \ge 0$: on the right of straight line $3x - y = 0$

$x - 2y \le 0$: on the left of straight line $x - 2y = 0$

$x + 3y - 4 \ge 0$: on the right of straight line $x + 3y - 4 = 0$

The answer is C.

15. B

$x \ge 6$: on the right of straight line $x = 6$

$2x + 3y \le 24$: on the left of straight line $2x + 3y = 24$

$x + 3y \ge 12$: on the right of straight line $x + 3y = 12$

16. B

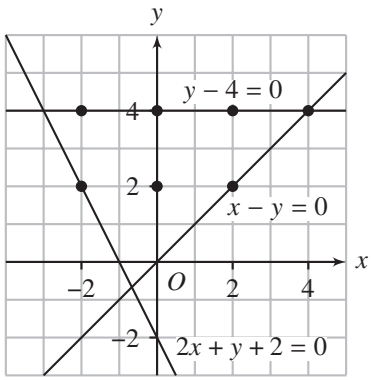
$y \ge 4$: above straight line $y = 4$

$x + y \le 8$: on the left of straight line $x + y = 8$

$2x + y \ge 8$: on the right of straight line $2x + y = 8$

17. A

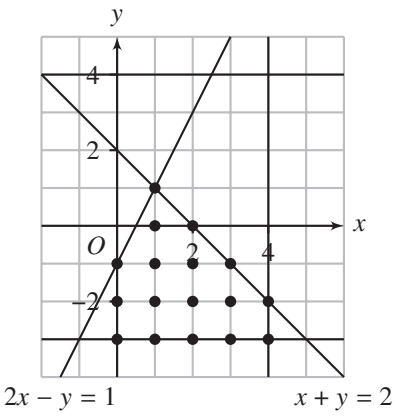
The solutions are shown in the figure below.



There are 7 solutions.

18. C

The solutions are shown in the figure below.



There are 17 solutions.

19. C

On the right of straight line $2x - y = 0$: $2x - y > 0$

On the left of straight line $2x + y = 0$: $2x + y < 0$

The answer is C.

20. A

On the left of straight line $x = 0$: $x \leq 0$

Below straight line $y = 2$: $y \leq 2$

21. A

The equations of the three boundaries are $x = -1$, $y = 2$ and $x + y = 4$.

We have $x \geq -1$, $y \geq 2$ and $x + y \leq 4$.

Thus, we have $\begin{cases} x + 1 \geq 0 \\ y - 2 \geq 0 \\ x + y - 4 \leq 0 \end{cases}$.

22. B

On the right of straight line $x = 2y$: $x \geq 2y$

On the left of straight line $2x - y = 12$: $2x - y \leq 12$

On the right of straight line $2x + 3y = 12$: $2x + 3y \geq 12$

The answer is B.

23. D

On the right of straight line $3x - 2y = 0$: $3x - 2y \geq 0$

On the left of straight line $x + y = 10$: $x + y \leq 10$

Above straight line $y = 0$: $y \geq 0$

24. C

On the left of straight line $2x - y = 0$: $2x - y \leq 0$
On the left of straight line $x + 2y = 6$: $x + 2y \leq 6$
On the right of straight line $x = 0$: $x \geq 0$
The answer is C.

25. A

On the right of straight line $2x + y + 3 = 0$: $2x + y + 3 \geq 0$
On the left of straight line $x - y - 2 = 0$: $x - y - 2 \leq 0$
On the left of straight line $x = 2$: $x \leq 2$
Below straight line $y = 3$: $y \leq 3$

26. C

On the left of straight line $x = -2$: $x < -2$
Below straight line $y = 0$: $y \leq 0$
The answer is C.

27. D

Check if the point satisfies each of the inequalities.

Point	$(1, 1)$	$(4, 6)$	$(7, 0)$
$x \geq 0$	✓	✓	✓
$y \geq 0$	✓	✓	✓
$x - y \geq -2$	✓	✓	✓
$3x + 2y \leq 24$	✓	✓	✓

All points lie in D.

28. B

I. ✓. Below the straight line $y = 3$: $b \leq 3$

II. ✗. Above the straight line $4y - 5x = -3$: $4b - 5a \geq -3$
We have $5a - 4b \leq 3$.

III. ✓. On the right of the straight line $5x + 2y = -9$: $5a + 2b \geq -9$
We have $5a + 2b + 9 \geq 0$.

29. D

I. ✓. Above straight line $y = 3$: $k \geq 3$

II. ✓. Below straight line $y = x + 3$: $k \leq h - 3$

III. ✓. Below straight line $y = 6 - 2x$: $k \leq 6 - 2h$

30. C

I. ✓. On the left of straight line $x - 2y = 0$: $x - 2y \leq 0$

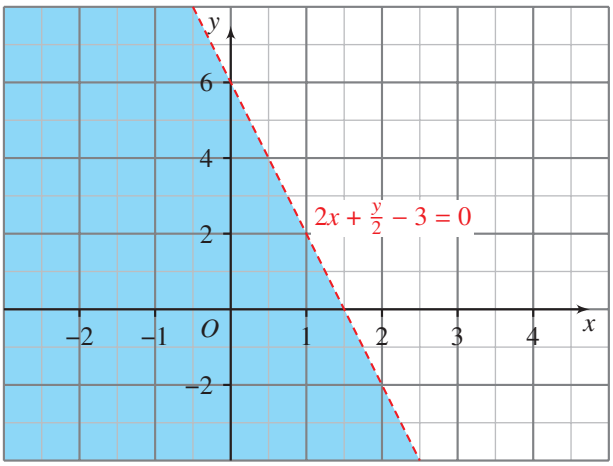
II. ✗. On the left of straight line $x + y = 6$: $x + y \leq 6$

III. ✓. On the right of straight line $x = 0$: $x \geq 0$

Conventional Questions

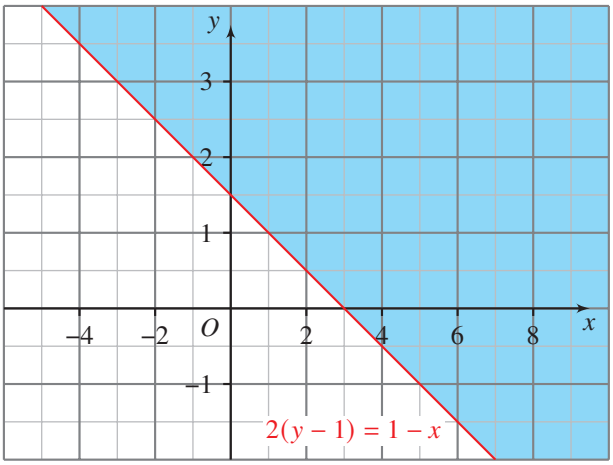
31. (Correct line) 1A

(Correct shaded region) 1A



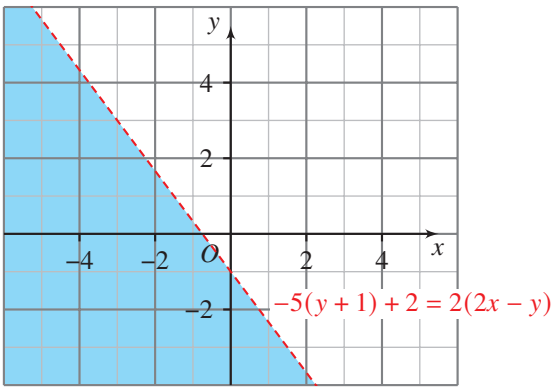
32. (Correct line) 1A

(Correct shaded region) 1A



33. (Correct line) 1A

(Correct shaded region) 1A



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