ADVANCED HIGHER MATHEMATICS

SYSTEMS OF LINEAR EQUATIONS 1

Use the method of **Gaussian elimination** to solve each set of linear equations for x, y and z:

1. $x + y + z = 10$
$2x + 3y + z = 21$
$x + 2y + 4z = 19$

2. $x + y + 2z = 9$
$3x + 4y + z = 18$
$2x + 3y + 2z = 15$

3. $x + 2y + z = 12$
$2x + 5y + 4z = 36$
$2x + 6y + 3z = 33$

4. $x + y + 2z = 4$
$3x + 4y + z = 19$
$2x + y + 4z = 6$

5. $x + 2y + z = 14$
$x + 3y + 3z = 24$
$2x + 3y + z = 22$

6. $x + y - z = 1$
$2x + 3y + z = 13$
$x + 2y - 2z = 0$

7. $x - y + z = 9$
$2x - y + z = 17$
$2x + 3y - z = 23$

8. $x + 2y + z = 4$
$2x + 5y - 3z = -9$
$4x - 2y - z = 21$

9. $x + y - z = 3$
$x + 2y + z = 1$
$2x - 3y + 2z = 2$

10. $x + 2y - z = 8$
$x + 3y + 2z = 27$
$2x - 2y + 5z = 2$

11. $x + 2y - z = -7$
$2x + 3y + z = 6$
$x + 4y + 2z = 7$

12. $x - 3y + z = 9$
$2x - 5y + 3z = 13$
$3x + 2y - 2z = -12$

13. $x + y - z = 11$
$2x + 3y + 2z = 16$
$-x + 2y + 2z = 4$

14. $x + y - 2z = 8$
$x + 2y + z = 3$
$3x - 2y + z = 5$

15. $x + y = 5$
$x + 2y + z = 9$
$x - 2z = -1$

16. $x + z = 3$
$x + y = 10$
$2x + y + 3z = 11$

17. $2x + y + 2z = 8$
$2x + 2y + 3z = 11$
$4x + y + z = 19$

18. $-x + y + z = 0$
$x + 2y + z = 5$
$2x + y - z = 7$

ANSWERS

1. $x = 5, y = 3, z = 2$

2. $x = 4, y = 1, z = 2$

3. $x = 3, y = 2, z = 5$

4. $x = 4, y = 2, z = -1$

5. $x = 6, y = 2, z = 4$

6. $x = 2, y = 2, z = 3$

7. $x = 8, y = 4, z = 5$

8. $x = 5, y = -2, z = 3$

9. $x = 2, y = 0, z = -1$

10. $x = -2, y = 7, z = 4$

11. $x = 3, y = -2, z = 6$

12. $x = -2, y = -4, z = -1$

13. $x = 2, y = 6, z = -3$

14. $x = 3, y = 1, z = -2$

15. $x = 3, y = 2, z = 2$

16. $x = 4, y = 6, z = -1$

17. $x = 4, y = 6, z = -3$

18. $x = 1, y = 3, z = -2$

ADVANCED HIGHER MATHEMATICS

SYSTEMS OF LINEAR EQUATIONS 2

Use the method of **Gaussian elimination** to solve each set of linear equations for x, y and z:

1. $x + y + z = 7$
$x + 3y + 2z = 11$
$2x + y + z = 11$

2. $x + y + z = 5$
$2x + 4y + z = 9$
$3x + 2y + z = 8$

3. $x + y + z = 9$
$3x + y + 2z = 21$
$4x + 2y + z = 26$

4. $x + y - z = 0$
$2x + 3y + z = 1$
$x - 2y + z = 8$

5. $x + y + z = 1$
$3x + 2y + z = 4$
$3x + 2y + 2z = 7$

6. $x + y + z = 2$
$3x - y + 2z = 4$
$2x + 3y + z = 7$

7. $x + 2y + z = 8$
$3x + y - 2z = -1$
$x + 5y - z = 8$

8. $x + y + z = 4$
$3x - 4y + z = 24$
$x - 2y - 2z = 7$

9. $x - 2y + z = 6$
$3x + y - 2z = 4$
$7x - 6y - z = 10$

10. $x - 3y - 2z = 4$
$2x + 3y - z = -1$
$5x + y + 3z = 4$

11. $x + 2z = 10$
$3x + y = 5$
$x + 2y - 3z = -12$

12. $x + 3y - z = -4$
$2x + 3y - z = -1$
$4x - y + z = 17$

13. $x + y + z = 1$
$3x + 3y + z = 4$
$3x + 2y + 2z = 2$

14. $x + y - z = 1$
$x + 2y + 3z = -1$
$x + 3y - z = 1$

15. $x + 3y + 5z = 3$
$4x + 2y + z = 3$
$2x + 3z = 5$

16. $x + y + 5z = 0$
$4x + y - 6z = -17$
$x - y - z = 0$

17. $x + 2y + z = 4$
$2x - y - z = 0$
$3x + 2y + z = 6$

18. $x - 2y - 2z = 3$
$5x - 2y + z = 10$
$3x - 4y - z = 10$

19. $x + 2y + z = 5$
$x + 4y + 3z = 11$
$7x - 2y + 3z = -13$

20. $x - 2y - 3z = -9$
$4x + 3y - 2z = 16$
$3x - 5y - 2z = -4$

21. $x - y - 3z = 1$
$2x + y - 2z = 9$
$x - 2y + 2z = 5$

22. $x + y + z = 6$
$-x + y + 2z = 5$
$3x + 2z = 12$

23. $x + 2y = 10$
$2x - y = 10$
$y + 3z = 11$

24. $x + 2y + 3z = -4$
$2x + 2y + z = 5$
$x + 4y + z = 4$

25. $x - 2y + z = 7$
$3x + y - z = -9$
$2x + 4y + 3z = 2$

26. $x + y - 2z = 0$
$2x - y + z = 21$
$2x + 3y + 2z = 16$

27. $x + 4y - z = 19$
$3x - 2y + z = -17$
$-2x + y + 3z = 6$

28. $x - 2y - 2z = 9$
$2x + 3y + z = 19$
$5x + 2y - 2z = 49$

29. $2x + y + 2z = 13$
$3x + 2y - z = 7$
$4x - 2y + 3z = 27$

30. $2x - y + 3z = 3$
$3x + 3y - 2z = 22$
$5x - 2y + 4z = 15$

ANSWERS

1. $x = 4, y = 1, z = 2$ **2.** $x = 1, y = 1, z = 3$ **3.** $x = 5, y = 2, z = 2$

4. $x = 3, y = -2, z = 1$ **5.** $x = 5, y = -7, z = 3$ **6.** $x = 3, y = 1, z = -2$

7. $x = 1, y = 2, z = 3$ **8.** $x = 5, y = 3, z = -4$ **9.** $x = 5, y = 3, z = 7$

10. $x = 1, y = -1, z = 0$ **11.** $x = 2, y = -1, z = 4$ **12.** $x = 3, y = -1, z = 4$

13. $x = 0, y = 1{\cdot}5, z = -0{\cdot}5$ **14.** $x = 0{\cdot}5, y = 0, z = -0{\cdot}5$ **15.** $x = 1, y = -1, z = 1$

16. $x = -2, y = -3, z = 1$ **17.** $x = 1, y = 1, z = 1$ **18.** $x = 1, y = -2, z = 1$

19. $x = -1, y = 3, z = 0$ **20.** $x = 4, y = 2, z = 3$ **21.** $x = 5, y = 1, z = 1$

22. $x = 2, y = 1, z = 3$ **23.** $x = 6, y = 2, z = 3$ **24.** $x = 3, y = 1, z = -3$

25. $x = -1, y = -2, z = 4$ **26.** $x = 8, y = -2, z = 3$ **27.** $x = -2, y = 5, z = -1$

28. $x = 7, y = 3, z = -4$ **29.** $x = 4, y = -1, z = 3$ **30.** $x = 5, y = 1, z = -2$