1. Find all solutions:
$$\begin{aligned} 3x + y &= 2 \\ x^3 + y - 2 &= 0 \end{aligned}$$

2. Find all solutions:
$$\begin{aligned} 2x^2 - 2x - y &= 14 \\ 2x - y &= -2 \end{aligned}$$

3. Find all solutions:
$$\begin{aligned} x^3 - y &= 0 \\ x - y &= 0 \end{aligned}$$

4. Find all solutions:
$$\begin{aligned} y &= x^2 \\ x^2 + (y-2)^2 &= 4 \end{aligned}$$

5. Find all solutions:
$$\begin{aligned} 3x^2 + 2y^2 &= 35 \\ 4x^2 - 3y^2 &= 24 \end{aligned}$$

6. Find all solutions:
$$\begin{aligned} x^2 - xy + y^2 &= 21 \\ x^2 + 2xy - 8y^2 &= 0 \end{aligned}$$

7. Find all solutions:
$$\begin{aligned} 4x + y - 3z &= 11 \\ 2x - 3y + 2z &= 9 \\ x + y + z &= -3 \end{aligned}$$

8. Find all solutions:
$$\begin{aligned} 3x - 2y + 4z &= 1 \\ x + y - 2z &= 3 \\ 2x - 3y + 6z &= 8 \end{aligned}$$

9. Find all solutions:
$$\begin{aligned} x - y + 2z &= 2 \\ x + 2y - z &= 5 \\ 5x - 8y + 13z &= 7 \end{aligned}$$

10. Find the equation of the parabola $y = ax^2 + bx + c$ that passes through the points $(2, 0)$, $(3, -1)$, and $(4, 0)$.

11. Find the unit vector in the same direction as $(-24, -7)$.

12. Find a vector with magnitude 3 in the same direction as $(4, -4)$.

13. Find the magnitude of the vector $(-\sqrt{3}, 3)$.

14. Find the dot product of vectors $(-4, 1)$ and $(2, -3)$.

15. Find a value k so that vectors $(2, 4)$ and $(k, -5)$ are orthogonal.

16. Let $u = (3, 4)$ and $v = (8, 2)$. Find the projection of u onto v. Then write u as a sum of two orthogonal vectors with $\text{proj}_v(u)$ being one of them.

17. Find the equation of the circle $x^2 + y^2 + Dx + Ey + F = 0$ that passes through the points $(-3, -1)$, $(2, 4)$, and $(-6, 8)$.

18. Identify the center and the radius of the circle $x^2 - 14x + y^2 + 8y + 40 = 0$.

19. Find the equation of the tangent line to the circle $x^2 + y^2 = 25$ at the point $(3, -4)$.

20. Find the center, vertices, foci, and eccentricity of the ellipse $\frac{(x-4)^2}{16} + \frac{(y+1)^2}{25} = 1$.

21. Consider the ellipse defined by $9x^2 + 4y^2 + 36x - 24y + 36 = 0$. Find the standard form of the equation of the ellipse. Find the ellipse's center, vertices, foci, and eccentricity.

22. Find the distance between points $(-1, 4, -2)$ and $(6, 0, 9)$.

23. Let $\vec{u} = (6, 2, 1)$ and $\vec{v} = (1, 3, -2)$. Find the cross product $\vec{u} \times \vec{v}$. Show that it is orthogonal to both $\vec{u}$ and $\vec{v}$.

24. Let $\vec{u} = (1, 1, -1)$, and $\vec{v} = (1, 1, 1)$. Find a unit vector that is orthogonal to both $\vec{u}$ and $\vec{v}$.

25. Let $\vec{u} = (2, 2, -3)$ and $\vec{v} = (0, 2, 3)$. Find the area of the parallelogram that has $\vec{u}$ and $\vec{v}$ as adjacent sides.

26. Find the area of the triangle with vertices $(0, 0, 0)$, $(1, 2, 3)$, and $(-3, 0, 0)$.

27. Let $p = (-4, -1, 0)$, and $\vec{v} = (3, 8, -6)$. Find a set of parametric equations and a set of symmetric equations for the line that passes through p and is parallel to $\vec{v}$.

28. Find the general form of the equation of the plane that passes through $(5, 6, 3)$ and is normal to the vector $(-2, 1, -2)$.

29. Find the general form of the equation of the plane that passes through the points $(2, 3, -2)$, $(3, 4, 2)$ and $(1, -1, 0)$.

30. Find a set of parametric equations of the line that passes through $(2, 3, 4)$ and is parallel to the xz-plane and the yz-plane.

31. Consider the planes $3x - 4y + 5z = 6$ and $x + y - z = 2$. Find parametric equations of their line of intersection.