1. Compute \( u \times v \).
   - \( u = i + k \), \( v = 2i + 3j - k \)
   - \( u = i - j + 2k \), \( v = 3i - 4j + k \)
   - \( u = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix} \), \( v = -2u \)

13. Find the area of the triangle with vertices \( P_1, P_2, P_3 \), where \( \overrightarrow{P_1P_2} = 2i + 3j - k \), \( \overrightarrow{P_1P_3} = i + 2j + 2k \)

17. Determine which of the following points are in the plane with equation: \( 3(x - 2) + 2(y + 3) - 4(z - 4) = 0 \).
   - (a) \((0, -2, 3)\)
   - (b) \((1, -2, 3)\)

19. Find an equation for the plane passing through the given points.
   - (a) \((0, 1, 2), (3, -2, 5), (2, 3, 4)\)
   - (b) \((2, 3, 4), (1, -2, 3), (-5, -4, 2)\)

21. Find an equation of the plane through \((-2, 3, 4)\) and perpendicular to the line through \((4, -2, 5)\) and \((0, 2, 4)\).

23. Find a line passing through \((-2, 5, -3)\) and perpendicular to the plane \(2x - 3y + 4z + 7 = 0\).

Answers

1. (b) \(-3i + 3j + 3k\)  (c) \(7i + 5j - k\)  (d) \(0i + 0j + 0k\)
13. \(\frac{3}{5}\sqrt{10}\)  15. 1  17. only (a)
19. (a) \(x - z + 2 = 0\)  (b) \(3x + y - 14z + 47 = 0\)
21. \(4x - 4y + z + 16 = 0\)
23. \(x = -2 + 2t, y = 5 - 3t, z = -3 + 4t\)