

Chapter 10 - Practice Questions

1. Find the length of the sides of the triangle with vertices $A(2, 6, -4)$, $B(-1, 2, 8)$, and $C(0, 1, 2)$.
2. Find the equation of the sphere with center $(1, -1, 2)$ and radius 3.
3. Find the center and radius of the sphere

$$x^2 + y^2 + z^2 + 4x + 6y - 10z + 2 = 0$$

4. Given that $\mathbf{u} = \mathbf{i} + \mathbf{j} - 2\mathbf{k}$, $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$, and $\mathbf{w} = \mathbf{j} - 5\mathbf{k}$, calculate
 - (a) $2\mathbf{u} + 3\mathbf{v}$
 - (b) $6\mathbf{u} - 5\mathbf{w}$
 - (c) $|\mathbf{v}|$
 - (d) $\mathbf{u} \cdot \mathbf{v}$
 - (e) The scalar projection of \mathbf{u} onto \mathbf{v}
 - (f) The vector projection of \mathbf{u} onto \mathbf{v}
 - (g) $\mathbf{u} \times \mathbf{v}$
 - (h) $|\mathbf{v} \times \mathbf{w}|$
 - (i) $\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w})$
 - (j) $\mathbf{w} \times \mathbf{w}$
 - (k) $\mathbf{u} \times (\mathbf{v} \times \mathbf{w})$
5. Find the value of x such that the vectors $\langle 2, x, 4 \rangle$ and $\langle 2x, 3, -7 \rangle$ are orthogonal
6. Find two unit vectors perpendicular to both $\langle 1, 0, 1 \rangle$ and $\langle 2, 3, 4 \rangle$
7. (a) Find a vector perpendicular to the plane through the points $A(1, 0, 0)$, $B(2, 0, -1)$, and $C(1, 4, 3)$
 (b) Find the area of the triangle ABC
8. Find the distance from the origin to the line $x = 1+t$, $y = 2-t$, $z = -1+2t$
9. Find an equation of the plane through the point $(1, 4, 5)$ with normal vector $\mathbf{n} = \langle 7, 1, 4 \rangle$
10. Find an equation of the plane passing through the point $(6, 5, -2)$ and parallel to the plane $x + y - z + 1 = 0$
11. Find an equation of the plane that passes through the point $(1, 6, -4)$ and contains the line $x = 1 + 2t$, $y = 2 - 3t$, $z = 3 - t$
12. Find the point at which the line $x = 1 + t$, $y = 2t$, $z = 3t$ intersects the plane $x + y + z = 1$
13. Find the distance from the point $(1, 2, 3)$ to the line $x = 2 + t$, $y = 2 - 3t$, $z = 5t$
14. Find the distance from the point $(2, 8, 5)$ to the plane $x - 2y - 2z = 1$
15. Find the distance between the parallel planes $z = x + 2y + 1$ and $3x + 6y - 3z = 4$.