

Review for Exam 1
Justify all your answers

1. Write the vector $\vec{A} = \langle 4, -3, 12 \rangle$ as the product of its length and direction.
2. Find the center and the radius of the sphere $x^2 + y^2 + z^2 - 10x - 6y + 4z = 29$.
3. Find the angle between the plane $x - y + z = 4$ and the plane $2x + 3y - z = 11$.
4. Find the area of the parallelogram with vertices $P = (1, 1, 1)$, $Q = (3, 2, 5)$, $R = (2, 5, 7)$ and $S = (0, 4, 3)$.
5. Let $\vec{A} = \langle 2, 3, 4 \rangle$ and $\vec{B} = \langle -1, 2, -1 \rangle$. Is $\vec{A}$ perpendicular to $\vec{B}$?
6. Find the distance of the point $S = (-1, 3, 2)$ from the plane $x - 2y + 4z = 12$.
7. Given the points $P = (2, 4, 3)$ and $Q = (4, 2, 1)$. Find the equation of the plane perpendicular to the vector $\vec{PQ}$ and through the midpoint of the segment PQ .
8. Find an equation for the plane through the points $P = (2, 3, 1)$, $Q = (1, 3, 4)$ and $R = (2, -1, 4)$.
9. Let l be the line through $P = (1, 1, 1)$ and parallel to the vector $\vec{v} = \langle 1, -1, 0 \rangle$. Let E be the plane through $Q = (3, 0, 2)$ and normal to the vector $\vec{n} = \langle 1, 3, -1 \rangle$. Find the point where the line l intersects the plane E .
10. Let $\vec{A} = \langle 1, 2, 4 \rangle$ and $\vec{B} = \langle -4, 3, 0 \rangle$. Find the projection of $\vec{A}$ onto $\vec{B}$.
11. Let $\vec{v}$ and $\vec{w}$ be perpendicular unit vectors. Compute $(2\vec{v} + 3\vec{w}) \cdot (3\vec{v} - \vec{w})$.
12. Let $\vec{v}$ and $\vec{w}$ be vectors with $\vec{v} \times \vec{w} = \langle 2, 4, -3 \rangle$. Compute $(\vec{v} + \vec{w}) \times (\vec{v} - \vec{w})$.
13. Compute $2\langle 1, 2, 3 \rangle - 4\langle 3, 2, 1 \rangle$.
14. Find an equation for the plane parallel to the vector $v = \langle 1, 1, 2 \rangle$ and through the points $P = (2, 1, 3)$ and $Q = (2, 3, 1)$.
15. Find the vector equation for the line in which the planes $x - y + z = 10$ and $x + y - z = 12$ intersect.
16. Let L be the line through the points $P = (1, -1, 3)$ and $Q = (2, 1, 3)$. Find the distance of the point $S = (5, 2, 1)$ from L .
17. Find all vectors of length 2 which are perpendicular to the vectors $v = \langle 1, 1, -1 \rangle$ and $w = \langle 3, 1, 2 \rangle$.
18. Which of the points $P = (3, 4, 5)$ and $Q = (5, 2, 3)$ is closest to the point $R = (5, 3, 4)$.