



Wir 1: 12.1 to 12.3

SECTION 12.1

Problem 1. Find the center and radius of the sphere $x^2 + y^2 + z^2 + 4x - 2y - 8z = 5$. Does this sphere intersect the xz plane? If so, what is the intersection?

Problem 2. Find equation of the sphere with center $(1, 2, 5)$ that touches the xy plane.

Problem 3. Find the equation of the sphere if one of their diameters has endpoints $(5, 1, 5)$ and $(7, 3, 9)$.

Problem 4. What does $y = 6 - x$ represent in \mathbb{R}^3 ?

Problem 5. What does $x^2 + z^2 = 16$ represent in \mathbb{R}^3 ?

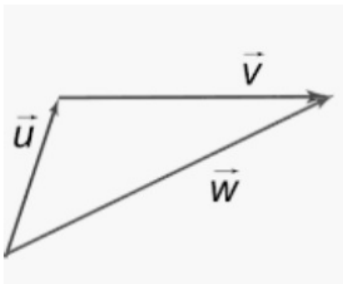
Problem 6. Write a set of inequalities that describes the solid upper hemisphere $x^2 + y^2 + z^2 = 9$.

SECTION 12.2

Problem 7. Give a graphical interpretation of vector sum and vector difference.

Problem 8. Given $\mathbf{a} = \langle -7, 1, 2 \rangle$ and $\mathbf{b} = \langle 5, -1, 1 \rangle$, find a unit vector in the direction of $\mathbf{a} + 2\mathbf{b}$.

Problem 9. For the picture seen below, write \mathbf{v} in terms of \mathbf{u} and \mathbf{w} .





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SECTION 12.3

Problem 10. Compute $\mathbf{a} \cdot \mathbf{b}$ if

- a.) $\mathbf{a} = \langle 4, 5, -1 \rangle$ and $\mathbf{b} = \langle 2, 1, 3 \rangle$.
- b.) $|\mathbf{a}| = 2$, $|\mathbf{b}| = 5$ and $\theta = 120^\circ$.
- c.) $|\mathbf{a}| = 6$, $|\mathbf{b}| = 4$ and \mathbf{a} is perpendicular to \mathbf{b} .
- d.) $|\mathbf{a}| = 6$, $|\mathbf{b}| = 4$ and \mathbf{a} is parallel to \mathbf{b} .

Problem 11. Are the vectors $-8\mathbf{i} + 4\mathbf{j} + 12\mathbf{k}$ and $6\mathbf{i} - 3\mathbf{j} - 9\mathbf{k}$ parallel, perpendicular, or neither?

Problem 12. The points $A(0, -1, 6)$, $B(2, 1, -3)$ and $C(5, 4, 2)$ form a triangle. Find $\angle C$.

Problem 13. Find the vector and scalar projection of $\langle 1, 2, 5 \rangle$ onto $\langle 0, 7, 4 \rangle$.