

Math 233 - Assignment 1

January 23, 2025

Name _____

Score _____

Show all work to receive full credit. Supply explanations when necessary. This assignment is due January 30.

1. The vector \vec{v} has initial point $(-2, 5)$ and terminal point $(3, -1)$. Find a unit vector in the direction of \vec{v} .
2. Find a vector of magnitude 7 whose direction is opposite that of $\langle 3, -4 \rangle$.
3. The vector \vec{w} has initial point $P(1, 1)$ and terminal point Q . Q lies on the x -axis and left of the initial point. Find the coordinates of Q if $\|\vec{w}\| = \sqrt{10}$.
4. Suppose \vec{u} and \vec{v} are nonzero, unequal vectors. Also suppose that $\vec{a} = 2\vec{u} - 4\vec{v}$ and $\vec{b} = 3\vec{u} - 7\vec{v}$. Find scalars α and β so that $\alpha\vec{a} + \beta\vec{b} = \vec{u} - \vec{v}$.
5. Let \vec{a} be the standard-position vector with terminal point at $(2, 5)$. Let \vec{b} be the vector with initial point at $(-1, 3)$ and terminal point $(1, 0)$. Compute $\|\vec{a} - 3\vec{b} + 14\hat{i} - 14\hat{j}\|$.
6. Determine the vector \vec{PM} , where M is the midpoint of $P(5, 2, -9)$ and $Q(-7, 11, 3)$.
7. Let $P(x, y, z)$ be a point situated at an equal distance from the origin and from the point $(4, 1, 2)$. Show that the coordinates of P satisfy $8x + 2y + 4z = 21$.
8. Show that the points $P(1, 0, 1)$, $Q(0, 1, 1)$, and $R(1, 1, 1)$ are NOT collinear.
9. Determine the vector of magnitude 13 that is parallel to $\vec{v} = 8\hat{i} - 7\hat{j} + 12\hat{k}$.
10. The vector \vec{v} has magnitude 4 and the direction from $(4, 5, -2)$ to $(3, 8, -9)$. The vector \vec{w} lies in the xy -plane, has length $\sqrt{8}$, and makes a 45° angle with the positive x -axis. Compute $\vec{v} - \vec{w}$.