

Math 233 - Quiz 1

January 22, 2026

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (1 point) Find the component form of the vector with initial point $P(-3, 5)$ and terminal point $Q(-8, -4)$.

$$\vec{PQ} = \langle -8 - (-3), -4 - 5 \rangle = \boxed{\langle -5, -9 \rangle = -5\hat{i} - 9\hat{j}}$$

2. (2 points) Let $\vec{v} = \langle -7, 1 \rangle$. Find the magnitude of \vec{v} . Then determine a unit vector with the same direction as \vec{v} .

$$\begin{aligned} \|\vec{v}\| &= \sqrt{(-7)^2 + (1)^2} \\ &= \sqrt{50} = 5\sqrt{2} \end{aligned} \quad \frac{\vec{v}}{\|\vec{v}\|} = \boxed{\frac{-7}{5\sqrt{2}}\hat{i} + \frac{1}{5\sqrt{2}}\hat{j}}$$

3. (3 points) Let $\vec{a} = \langle -1, 3 \rangle$ and $\vec{b} = \langle 4, 6 \rangle$. Compute $\|3\vec{a} - 2\vec{b}\|$.

$$\begin{aligned} 3\vec{a} &= \langle -3, 9 \rangle & 3\vec{a} - 2\vec{b} &= \langle -11, -3 \rangle \\ -2\vec{b} &= \langle -8, -12 \rangle & \|3\vec{a} - 2\vec{b}\| &= \sqrt{(-11)^2 + (-3)^2} = \boxed{\sqrt{130}} \end{aligned}$$

4. (2 points) Find the component form of the vector of magnitude 5 that makes a 150° angle with the positive x -axis.

$$\begin{aligned} \vec{u} &= 5 \cos 150^\circ \hat{i} + 5 \sin 150^\circ \hat{j} \\ &= 5\left(-\frac{\sqrt{3}}{2}\right)\hat{i} + 5\left(\frac{1}{2}\right)\hat{j} = \boxed{-\frac{5\sqrt{3}}{2}\hat{i} + \frac{5}{2}\hat{j}} \end{aligned}$$

5. (2 points) Referring to the vectors shown below, sketch the vector $\frac{1}{2}\vec{v} + \vec{w}$.

