

# 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  $\vec{v}$ .

$$\begin{aligned}\|\vec{v}\| &= \sqrt{(-7)^2 + (1)^2} \\ &= \sqrt{50} = 5\sqrt{2}\end{aligned}$$

$$\frac{\vec{v}}{\|\vec{v}\|} = \boxed{-\frac{7}{5\sqrt{2}}\hat{i} + \frac{1}{5\sqrt{2}}\hat{j}}$$

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

$$3\vec{a} = \langle -3, 9 \rangle \quad 3\vec{a} - 2\vec{b} = \langle -11, -3 \rangle$$

$$-2\vec{b} = \langle -8, -12 \rangle$$

$$\|3\vec{a} - 2\vec{b}\| = \sqrt{(-11)^2 + (-3)^2} = \boxed{\sqrt{130}}$$

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

$$\vec{u} = 5 \cos 150^\circ \hat{i} + 5 \sin 150^\circ \hat{j}$$

$$= 5\left(-\frac{\sqrt{3}}{2}\right)\hat{i} + 5\left(\frac{1}{2}\right)\hat{j} = \boxed{-\frac{5\sqrt{3}}{2}\hat{i} + \frac{5}{2}\hat{j}}$$

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

