

## Math 121 – Section 9.4 Solutions

25.  $P = (0, 0), Q = (3, 4)$

$$\vec{v} = \overrightarrow{PQ} = \langle 3 - 0, 4 - 0 \rangle = \langle 3, 4 \rangle = 3\mathbf{i} + 4\mathbf{j}$$

27.  $P = (3, 2), Q = (5, 6)$

$$\vec{v} = \overrightarrow{PQ} = \langle 5 - 3, 6 - 2 \rangle = \langle 2, 4 \rangle = 2\mathbf{i} + 4\mathbf{j}$$

33.  $\vec{v} = 3\mathbf{i} - 4\mathbf{j} \Rightarrow \|\vec{v}\| = \sqrt{3^2 + (-4)^2} = 5$

35.  $\vec{v} = \mathbf{i} - \mathbf{j} \Rightarrow \|\vec{v}\| = \sqrt{1^2 + (-1)^2} = \sqrt{2}$

39.  $\vec{v} = 3\mathbf{i} - 5\mathbf{j}, \vec{w} = -2\mathbf{i} + 3\mathbf{j}$

$$2\vec{v} + 3\vec{w} = 2(3\mathbf{i} - 5\mathbf{j}) + 3(-2\mathbf{i} + 3\mathbf{j}) = 6\mathbf{i} - 10\mathbf{j} - 6\mathbf{i} + 9\mathbf{j} = -\mathbf{j}$$

41.  $\vec{v} - \vec{w} = (3\mathbf{i} - 5\mathbf{j}) - (-2\mathbf{i} + 3\mathbf{j}) = 5\mathbf{i} - 8\mathbf{j}$

$$\|\vec{v} - \vec{w}\| = \sqrt{5^2 + (-8)^2} = \sqrt{89}$$

45.  $\vec{v} = 5\mathbf{i}$

$$\hat{v} = \frac{\vec{v}}{\|\vec{v}\|} = \frac{5\mathbf{i}}{5} = \mathbf{i}$$

47.  $\vec{v} = 3\mathbf{i} - 4\mathbf{j}$

$$\hat{v} = \frac{\vec{v}}{\|\vec{v}\|} = \frac{3\mathbf{i} - 4\mathbf{j}}{5} = \frac{3}{5}\mathbf{i} - \frac{4}{5}\mathbf{j}$$

55.  $\|\vec{v}\| = 5, \alpha = 60^\circ$

$$\vec{v} = 5(\cos 60^\circ \mathbf{i} + \sin 60^\circ \mathbf{j}) = \frac{5}{2}\mathbf{i} + \frac{5\sqrt{3}}{2}\mathbf{j}$$

57.  $\|\vec{v}\| = 14, \alpha = 120^\circ$

$$\vec{v} = 14(\cos 120^\circ \mathbf{i} + \sin 120^\circ \mathbf{j}) = -7\mathbf{i} + 7\sqrt{3}\mathbf{j}$$