

Quiz # 1 Solutions.

1. $\mathbf{PQ} = \langle 3, 2 \rangle$, $|\mathbf{PQ}| = \sqrt{13}$, and so $\mathbf{PQ} = \sqrt{13} \left\langle \frac{3}{\sqrt{13}}, \frac{2}{\sqrt{13}} \right\rangle$.
2. First, $2y \frac{dy}{dx} + \frac{dy}{dx} - \sin y \frac{dy}{dx} + 1 = 0$ so $\frac{dy}{dx} = \frac{-1}{2y+1-\sin y}$. At $(0, 0)$, the slope is $\frac{-1}{1}$. Thus $\mathbf{v} = \langle 1, -1 \rangle$ is a tangent vector. Making two unit vectors gives $\mathbf{u} = \left\langle \frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right\rangle$ and $-\mathbf{u} = \left\langle -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle$.
3. Draw $\mathbf{u} - \mathbf{v}$ by putting $-\mathbf{v}$ at the tip of \mathbf{u} and adding them graphically.
- 4.

$$\theta = \cos^{-1} \left(\frac{\mathbf{u} \cdot \mathbf{v}}{|\mathbf{u}||\mathbf{v}|} \right) = \cos^{-1} \left(\frac{21}{7\sqrt{18}} \right) = \cos^{-1} \left(\frac{1}{\sqrt{2}} \right) = \frac{\pi}{4}.$$