1. For each of the following pairs of points $A$ and $B$, determine the matrix form of $\overrightarrow{AB}$. On a set of axes, sketch $\overrightarrow{AB}$ and its corresponding position vector.
   a) $A = (1, 3), \quad B = (4, 4)$  
   b) $A = (3, -1), \quad B = (3, -3)$

2. Given the point $P = (2, -1, 4)$, find a point $Q$ such that $\overrightarrow{PQ} = \begin{pmatrix} 7 \\ 6 \\ -3 \end{pmatrix}$.

3. For each of the following pairs of vectors $\mathbf{u}$ and $\mathbf{v}$, determine the vector sum $\mathbf{u} + \mathbf{v}$, using matrix addition of vectors and using geometric addition of vectors.
   a) $\mathbf{u} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}, \quad \mathbf{v} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$  
   b) $\mathbf{u} = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, \quad \mathbf{v} = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$

4. Let $\mathbf{u} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} 0 \\ 2 \end{pmatrix}$.
   a) Determine the following vectors, using matrix form and using geometric form.
      i) $-2\mathbf{u}$  
      ii) $\mathbf{u} - \mathbf{v}$  
      iii) $2\mathbf{u} + \frac{1}{2}\mathbf{v}$
   b) Calculate $||\mathbf{u}||$ and $||\mathbf{v}||$.
   c) Determine (in matrix form) the vectors $\hat{\mathbf{u}}$ and $\hat{\mathbf{v}}$.

5. a) Calculate the following trigonometric ratios:
      i) $\sin \left( \frac{3\pi}{2} \right)$  
      ii) $\cos \left( \frac{3\pi}{4} \right)$  
      iii) $\tan \left( \frac{7\pi}{6} \right)$
   b) Use your calculator to determine (in both radians and degrees) the values for $\theta$, where $0 \leq \theta < 2\pi$, that satisfy the following equations.
      i) $\tan \theta = 0.25$  
      ii) $\tan \theta = -0.37$

6. a) The vector $\mathbf{a}$ has magnitude 10 and direction $\frac{\pi}{3}$. Write $\mathbf{a}$ in component form.
   b) The vector $\mathbf{b}$ has magnitude 3 and direction $\pi$. Write $\mathbf{b}$ in component form.
   c) Find the magnitude and direction of the vector $\mathbf{c} = 4\mathbf{i} - 3\mathbf{j}$.
   d) Find the magnitude and direction of the vector $\mathbf{d} = -5\mathbf{j}$.

7. Let $A = (5, 5, 1), \quad B = (3, 3, 2)$ and $C = (1, 4, 4)$.
   a) Determine the lengths of the sides of the triangle $ABC$.
   b) Determine the interior angles of the triangle $ABC$.

8. a) Use a sum or difference formula to calculate the exact value of $\sin \left( \frac{\pi}{12} \right)$.
   b) Use part a) to determine the exact value of $\cos \left( \frac{5\pi}{12} \right)$. 