1) Given that that the initial and terminal points of $\vec{v}$ are $(3,2,0)$ and $(4,1,6)$ respectively find the following:

a) Component form of $\vec{v}$.

b) $\|\vec{v}\|$

c) A unit vector in the direction of $\vec{v}$.

d) Write the vector using standard unit vector notation.

2) Find each scalar multiple of $\vec{v}=\langle 1,2,2\rangle$.

a) $2\vec{v}$

b) $-\vec{v}$

c) $0\vec{v}$

d) $\frac{3}{2}\vec{v}$

3) Find vector $\vec{z}$, given that $\vec{u}=\langle 1,2,3\rangle$, $\vec{v}=\langle 2,2,-1\rangle$, and $\vec{w}=\langle 4,0,-4\rangle$.

a) $\vec{z}=\vec{u}-\vec{v}$

b) $\vec{z}=2\vec{u}+4\vec{v}-\vec{w}$

c) $2\vec{u}+\vec{v}-\vec{w}+3\vec{z}=0$

4) Determine which of the vectors is (are) parallel to $\vec{z}$ $\vec{z} = \langle 3, 2, -5 \rangle$

a) $\langle -6, -4, 10 \rangle$

b) $\left\langle 2, \frac{4}{3}, -\frac{10}{3} \right\rangle$

c) $\langle 6, 4, 10 \rangle$

d) $\langle 1, -4, 2 \rangle$

5) Use vectors to determine whether the points $(0,-2,-5)$, $(3,4,4)$, $(2,2,1)$ are collinear.

6) Use vectors to show that the points $(2,9,1)$, $(3,11,4)$, $(0,10,2)$, $(1,12,5)$ form the vertices of a parallelogram.

7) Determine the values of c that satisfy the equation $\|c\vec{v}\| = 7$. Let $\vec{v} = 2\mathbf{i} + 2\mathbf{j} - \mathbf{k}$

8) Find the vector $\vec{v}$ with a magnitude of 10 and in the same direction as $\vec{u} = \langle 0,3,3 \rangle$.

9) $\vec{v}$ lies in the $yz-plane$, has magnitude 2, and makes an angle of $30°$ with the positive $y-axis$. Write the component form of $\vec{v}$.

10) Let $\vec{u} = \mathbf{i} + \mathbf{j}$, $\vec{v} = \mathbf{j} + \mathbf{k}$, and $\vec{w} = a\vec{u} + b\vec{v}$.

a) If $\vec{w} = 0$, show that a and b must both be zero.

b) Find a and b such that $\vec{w} = \mathbf{i} + 2\mathbf{j} + \mathbf{k}$.

c) Show that no choice of a and b yields $\vec{w} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$.