Practice Problems

1. Find the position vector for the vector that starts at (1,5,1,7) and ends at (9, -3, -1, 11).

2. Find the magnitude of the following vectors: $\overrightarrow{a} = \begin{bmatrix} -1 \\ 3 \end{bmatrix}$, $\overrightarrow{b} = \begin{bmatrix} 2 \\ 4 \\ 1 \end{bmatrix}$,

   $\overrightarrow{c} = \begin{bmatrix} 0.5 \\ 2.4 \\ 10.2 \\ 8.7 \end{bmatrix}$

3. Let $\overrightarrow{a} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$, $\overrightarrow{b} = \begin{bmatrix} -6 \\ 4 \end{bmatrix}$, $\overrightarrow{c} = \begin{bmatrix} 1 \\ -8 \end{bmatrix}$. Find $\overrightarrow{v}$ if $\overrightarrow{v} = 2\overrightarrow{a} - 3\overrightarrow{b} + 4\overrightarrow{c}$

4. Find the unit vector of the following vectors: $\overrightarrow{x} = \begin{bmatrix} 1 \\ -8 \end{bmatrix}$, $\overrightarrow{y} = \begin{bmatrix} -3 \\ 6 \\ 7 \end{bmatrix}$,

   $\overrightarrow{z} = \begin{bmatrix} 10 \\ -2 \\ -8 \\ 2 \end{bmatrix}$

5. Check whether the following pairs of vectors are orthogonal:

$$\overrightarrow{a} = \begin{bmatrix} 1 \\ 3 \end{bmatrix} \text{ and } \overrightarrow{b} = \begin{bmatrix} -4 \\ -6 \end{bmatrix}$$

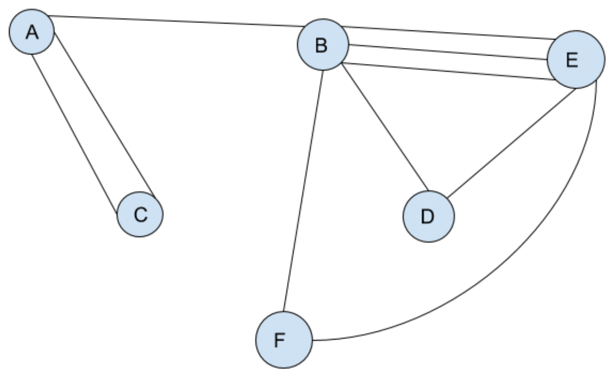
$$\overrightarrow{c} = \begin{bmatrix} 12 \\ 4 \\ -2 \end{bmatrix} \text{ and } \overrightarrow{d} = \begin{bmatrix} 1 \\ 1 \\ 8 \end{bmatrix}$$

$$\overrightarrow{e} = \begin{bmatrix} 6 \\ 6 \\ 6 \end{bmatrix} \text{ and } \overrightarrow{f} = \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$$

6. Find the transpose and inverse of the following matrices:

   $\mathbf{P} = \begin{pmatrix} 21 & -1 & 43 \\ 91 & -12 & 41 \\ 17 & -26 & -65 \end{pmatrix}$

7. 6 towns, named A through F, have a series of roads connecting them. If you look at the picture, you can see that there are two roads connecting A and C, for example.



Create a matrix that displays how many roads connect each of the towns. Your matrix should look like

	A	B	C	D	E	F
A	0	1	2	0	0	0
B						
C						
D						
E						
F						

The first row is filled out to demonstrate the solution. Fill in the rest of the spaces.