

Chapter 1

Vectors

1.1 Vectors in Two and Three Dimensions

1. Draw (or just visualize) the points (1) (0) in the picture below!



2. Although more difficult for students to appreciate this on paper, the figures should look something like the following. Note that the origin is not at a vertex of the triangle that that is at the tail of the three vectors.



In problems 3 and 4, you supply each student their own vectors to draw (or visualize) what properties are being used?

3. Say $\vec{a} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$, $\vec{b} = \begin{bmatrix} -1 \\ 7 \end{bmatrix}$, $\vec{c} = \begin{bmatrix} 2 \\ -4 \end{bmatrix}$, $\vec{d} = \begin{bmatrix} 6 \\ 9 \end{bmatrix}$, $\vec{e} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, $\vec{f} = \begin{bmatrix} 4 \\ 8 \end{bmatrix}$.
 then $\vec{a} + \vec{b} = \begin{bmatrix} 2 \\ 12 \end{bmatrix}$, $\vec{c} + \vec{d} = \begin{bmatrix} 8 \\ 13 \end{bmatrix}$, $\vec{e} + \vec{f} = \begin{bmatrix} 5 \\ 8 \end{bmatrix}$, $\vec{a} + \vec{c} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$, $\vec{b} + \vec{d} = \begin{bmatrix} 5 \\ 16 \end{bmatrix}$, $\vec{c} + \vec{e} = \begin{bmatrix} 3 \\ -4 \end{bmatrix}$,
 then $\vec{a} + \vec{b} + \vec{c} = \begin{bmatrix} 0 \\ 15 \end{bmatrix}$, $\vec{c} + \vec{d} + \vec{e} = \begin{bmatrix} 9 \\ 13 \end{bmatrix}$, $\vec{e} + \vec{f} + \vec{a} = \begin{bmatrix} 8 \\ 17 \end{bmatrix}$, $\vec{a} + \vec{b} + \vec{d} = \begin{bmatrix} 8 \\ 22 \end{bmatrix}$, $\vec{b} + \vec{c} + \vec{f} = \begin{bmatrix} 5 \\ 19 \end{bmatrix}$, $\vec{c} + \vec{d} + \vec{e} = \begin{bmatrix} 9 \\ 13 \end{bmatrix}$,
 then $\vec{a} + \vec{b} + \vec{c} + \vec{d} + \vec{e} + \vec{f} = \begin{bmatrix} 24 \\ 55 \end{bmatrix}$.
 4. Say $\vec{a} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$, $\vec{b} = \begin{bmatrix} -1 \\ 7 \end{bmatrix}$, $\vec{c} = \begin{bmatrix} 2 \\ -4 \end{bmatrix}$, $\vec{d} = \begin{bmatrix} 6 \\ 9 \end{bmatrix}$, $\vec{e} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, $\vec{f} = \begin{bmatrix} 4 \\ 8 \end{bmatrix}$.
 then $\vec{a} + \vec{b} + \vec{c} + \vec{d} + \vec{e} + \vec{f} = \begin{bmatrix} 24 \\ 55 \end{bmatrix}$.
 5. We start with the three vectors $\vec{a}$ and $\vec{b}$. We then complete the parallelogram as in the figure on the left. The vector from the origin to this same vertex is the vector $\vec{a} + \vec{b}$. In the figure on the right we have translated vector $\vec{b}$ so that its tail is the head of vector $\vec{a}$. The vector $\vec{a} + \vec{b}$ is the directed third side of this triangle.

Vector Calculus 5th Edition Solutions Manual

Karen Pao, Frederick Soon



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