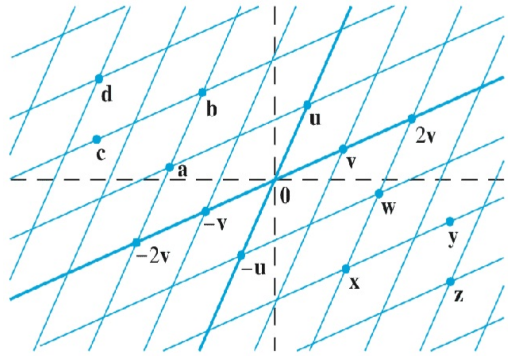
1. Use the accompanying figure to write each vectors **x**, **y**, **c** and **w** as a linear combination of **u** and **v**. Is every vector in $\mathbb{R}^2$ a linear combination of **u** and **v**?



2. Let $A=\begin{bmatrix} 1 & 0 & -4 \\ 0 & 3 & -2 \\ -2 & 6 & 3 \end{bmatrix}$, and $b=\begin{bmatrix} 4 \\ 1 \\ -4 \end{bmatrix}$

Denote the columns of A by $\{\mathbf{a}_1,\mathbf{a}_2,\mathbf{a}_3\}$ and let W=Span$\{\mathbf{a}_1,\mathbf{a}_2,\mathbf{a}_3\}$.

a. Is **b** in $\{\mathbf{a}_1,\mathbf{a}_2,\mathbf{a}_3\}$? How many vectors are in $\{\mathbf{a}_1,\mathbf{a}_2,\mathbf{a}_3\}$?

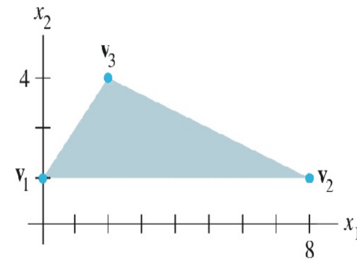
b. Is **b** in W? How many vectors are in W?

c. Show that $\mathbf{a}_1$ is in W. [*Hint:* Row operations are unnecessary.]

3. A thin triangular plate of uniform density and thickness has vertices at

$$v_1 = (0,2),\ v_2 = (8,2),\ v_3 = (2,4)$$

as in the figure to the? right, and the mass of the plate is 3 g. Complete parts a and b below.



a. Find the (x,y)-coordinates of the center of mass of the plate. This "balance point" of the plate coincides with the center of mass of a system consisting of three 1-gram point masses located at the vertices of the plate.

b. Determine how to distribute an additional mass of 6 g at the three vertices of the plate to move the balance point of the plate to (2,2). [*Hint:* Let w_1, w_2, and w_3 denote the masses added at the three vertices, so that $w_1+w_2+w_3=6$.]