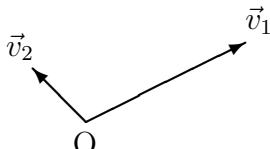


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**Problem Set 2**  
**Due on Fri, Jul 11**

- 1) Consider two vectors  $\vec{v}_1$  and  $\vec{v}_2$  in  $\mathbb{R}^3$  that are not parallel. Which vectors in  $\mathbb{R}^3$  are linear combinations of  $\vec{v}_1$  and  $\vec{v}_2$ ? Describe the set of these vectors geometrically. Include a sketch in your answer.
- 2) The two column vectors  $\vec{v}_1$  and  $\vec{v}_2$  of a  $2 \times 2$  matrix  $A$  are shown in the figure. Consider the linear transformation  $T(\vec{x}) = A\vec{x}$ . Sketch the vector  $T\left(\begin{bmatrix} 2 \\ -1 \end{bmatrix}\right)$ .  


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- 3) Find the matrix of the reflection in  $\mathbb{R}^3$  about the  $xz$ -plane.
- 4) Find the matrix of the rotation in  $\mathbb{R}^3$  about the  $y$ -axis through an angle  $\theta$ , counterclockwise as viewed from the positive  $y$ -axis.
- 5) Compute  $A^{2014}$  when  $A = \frac{1}{2} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}$ .