

Geometric interpretation of 2- and 3-dimensional vectors

1. You have three readings of the position of a vehicle relative to your location, where the first reading corresponds to the east-west offset in km (east being positive), and the second reading corresponds to the north-south offset in km (north being positive). Plot the following three positions relative to yours:

$$\mathbf{u}_1 = \begin{pmatrix} 3.2 \\ 0.5 \end{pmatrix}, \mathbf{u}_2 = \begin{pmatrix} 3.4 \\ 0.1 \end{pmatrix} \text{ and } \mathbf{u}_3 = \begin{pmatrix} 3.7 \\ -0.6 \end{pmatrix}.$$

2. If the first reading was made two minutes ago, the second reading was one minute ago, and the third reading was taken right now, draw an arrow in your plot that estimates the direction the vehicle is travelling.

3. You are controlling a drone with a downward-facing infrared camera, and you detect the heat signature of what you suspect is a missing person. The drone sends you back its position $\mathbf{u} = \begin{pmatrix} 5.2 \\ -2.7 \\ 0.12 \end{pmatrix}$ where the first

two entries are as described above, and the third entry is its elevation relative to you, also in km. Plot the position of the drone.

4. If you were to instruct an all-terrain search-and-rescue vehicle to n meters east or west, and then m meters north or south from your current location, what instructions would you give based on the position in Question 3.