Three-Dimensions

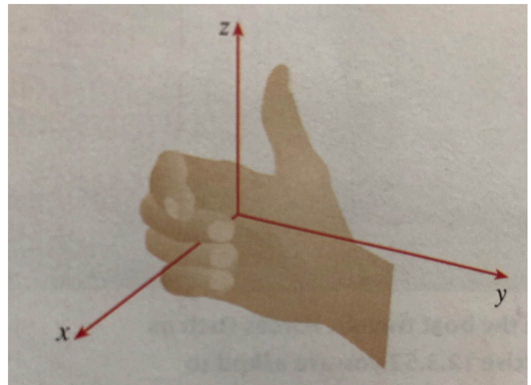
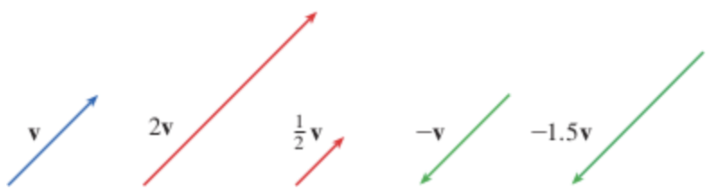


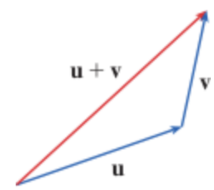
FIGURE 2
Right-hand rule

Conventions:

- The direction of the z-axis is determined by the right-hand rule: if you curl the fingers of your right hand around the z-axis in the direction of a 90° counterclockwise rotation from the positive x-axis to the positive y-axis, then your thumb points in the positive direction of the z-axis. Note, picture from Stewart's text.
- When drawing axis, the arrows denote the positive side of an axes.

(Some of the) Things we can do with Vectors ($\overrightarrow{u}$, $\overrightarrow{v}$):
Add   Scale   Subtract   Find the Length/Magnitude: $||\overrightarrow{v}||$

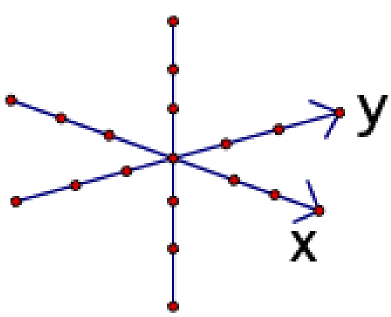


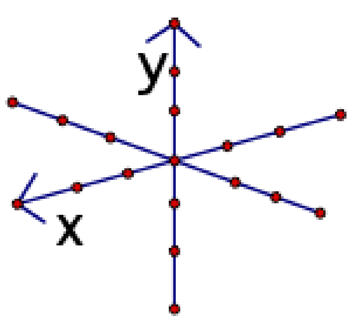


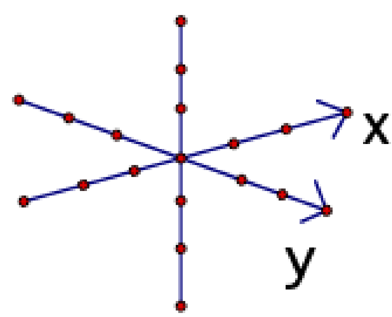
While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

1. For each of the following set of axis below, identify the positive z-axis:

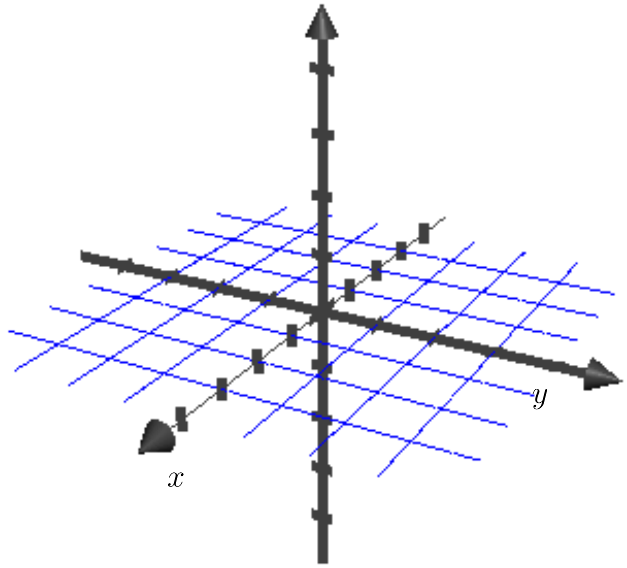






2. Identify the yz plane on the axis in the middle.

Let $A = (0, 0, 0)$, $B = (1, 2, 3)$, & $C = (0, -2, 1)$



3. Use the coordinate axis provided for:

   (a) Plot the points A, B, & C

   Note that the points plotted in part (a) cast 'shadows' on the xy-plane. That is, if we drop a perpendicular from a point $P = (a, b, c)$ to the xy-plane, the point $Q = (a, b, 0)$ is the *projection* of P to the xy-plane.

   (b) Find the yz-plane projections of the three points you plotted in part (a).

   (c) Find the distance between the points A and B.

4. Plot the vectors $\overrightarrow{AB}$ and $\overrightarrow{CA}$ on the axis above.

   Notation: vectors $\overrightarrow{v}$ that move a units in the x direction, b in the y direction, and c in the z direction can be denoted, $\langle a, b, c\rangle$. These are the components of $\overrightarrow{v}$.

5. Write the components of $\overrightarrow{AB}$ and $\overrightarrow{CA}$

6. Plot the vector $\overrightarrow{i}$