Closing Tue, Jan. 20: 12.5(1)(2)(3)
Closing Thu, Jan. 22: 12.6
Note: No class Monday. No MSC Sunday or Monday. So get your last minute 12.5 questions answered today!

12.5 Lines/Planes in 3 Dimensions

**Lines:** \( x = x_0 + at, \quad y = y_0 + bt, \quad z = z_0 + ct \)
\[ \mathbf{v} = \langle a, b, c \rangle = \text{direction vector} \]
\[ \mathbf{r}_0 = \langle x_0, y_0, z_0 \rangle = \text{a position vector} \]

**Planes:** \( a(x - x_0) + b(y - y_0) + c(z - z_0) = 0 \)
\[ \mathbf{n} = \langle a, b, c \rangle = \text{a normal vector.} \]
\[ \mathbf{r}_0 = \langle x_0, y_0, z_0 \rangle = \text{a position vector} \]
To find equations for a line

- **Info given?**
  - Done.

- **Find two points**
  - \( \vec{v} = \overrightarrow{AB} \) (subtract components)
  - \( \vec{r}_0 = \vec{A} \)

To find the equation for a plane

- **Info given?**
  - Done.

- **Find three points**
  - Two vectors parallel to the plane: \( \overrightarrow{AB} \) and \( \overrightarrow{AC} \)
  - \( \vec{n} = \overrightarrow{AB} \times \overrightarrow{AC} \)
  - \( \vec{r}_0 = \vec{A} \)