

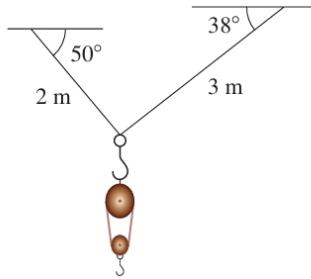
1. (a) Find an equational representation $a_1x_1 + a_2x_2 + a_3x_3 = b$ of the plane with parametric representation:

$$\mathbf{x} = \begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix} + c_1 \begin{bmatrix} 0 \\ 2 \\ -2 \end{bmatrix} + c_2 \begin{bmatrix} 3 \\ 3 \\ 1 \end{bmatrix}, c_1, c_2 \in \mathbb{R}$$

What is the geometric meaning of the vector $\mathbf{a} = (a_1, a_2, a_3)$

- (b) Find a parametric representation of the plane $x_1 + x_2 + x_3 = 1$

2. Consider the points P such that the distance from P to $A(-1, 5, 3)$ is twice the distance from P to $B(6, 2, -2)$. Show that the set of all such points is a sphere, and find its center and radius.
3. A block-and-tackle pulley hoist is suspended in a warehouse by ropes of lengths 2 m and 3 m. The hoist weighs 350 N. The ropes, fastened at different heights, make angles of 50° and 38° with the horizontal. Find the tension in each rope and the magnitude of each tension (cos and sin in results are acceptable).



4. Show that if θ is the angle between the vectors \mathbf{a} and \mathbf{b} , then $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}||\mathbf{b}|\cos\theta$