Equations of Lines

Increasing Level of Difficulty

1. Show that the point with position vector $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$ lies on the line L that has the vector equation $\vec{\mathbf{r}} = \begin{pmatrix} -1 \\ 4 \end{pmatrix} + t\begin{pmatrix} -1 \\ 3 \end{pmatrix}$. [***no*** *calculator*]

2. Write the equation of the line $2x + 3y = 7$ in vector equation form of a line; that is, in the form $\vec{\mathbf{r}} = \vec{\mathbf{a}} + t\vec{\mathbf{b}}$, such that the components of $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ are integers.
[***no*** *calculator*]

3. The two lines with vector equations $\vec{\mathbf{r}} = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} + \lambda\begin{pmatrix} 1 \\ -1 \\ -3 \end{pmatrix}$ and $\vec{\mathbf{r}} = \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix} + \mu\begin{pmatrix} 0 \\ 3 \\ 5 \end{pmatrix}$ intersect at point P. Find the coordinates of P. [***no*** *calculator*]

4. Find the two points on the line with Cartesian equation $x - 5 = \dfrac{y+4}{-4} = \dfrac{z-6}{3}$ which are a distance of 5 units from the origin. [***no*** *calculator*]