# 10/28/09

Wednesday, October 28, 2009
9:04 AM

**9.** Express the following as linear combinations of $\mathbf{p}_1 = 2 + x + 4x^2$, $\mathbf{p}_2 = 1 - x + 3x^2$, and $\mathbf{p}_3 = 3 + 2x + 5x^2$.

(a) $-9 - 7x - 15x^2 = q \approx \begin{bmatrix} -9 \\ -7 \\ -15 \end{bmatrix}$ $\quad p_1 = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$ $\quad p_2 = \begin{bmatrix} 1 \\ -1 \\ 3 \end{bmatrix}$ $\quad p_3 = \begin{bmatrix} 3 \\ 2 \\ 5 \end{bmatrix}$

$q = c_1 p_1 + c_2 p_2 + c_3 p_3$ for some $c_1, c_2, c_3 \in \mathbb{R}$ ?

find $c_1, c_2, c_3$

$$\left[\begin{array}{ccc|c} 2 & 1 & 3 & -9 \\ 1 & -1 & 2 & -7 \\ 4 & 3 & 5 & -15 \end{array}\right] \longrightarrow \text{solve}$$

**15.** Find an equation for the plane spanned by the vectors $\mathbf{u} = (-1, 1, 1)$ and $\mathbf{v} = (3, 4, 4)$.

what vectors are in ~~the~~ span $(\{\vec{u}, \vec{v}\}) = \{\vec{x} \in \mathbb{R}^3 \mid \vec{x} = c_1\vec{u} + c_2\vec{v}\}$

write $\vec{x} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \Rightarrow c_1 \begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix} + c_2 \begin{pmatrix} 3 \\ 4 \\ 4 \end{pmatrix} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$

$$\begin{pmatrix} -1 & 3 \\ 1 & 4 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} c_1 \\ c_2 \end{pmatrix} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

for which $x, y, \& z$ is the system consistent.

$$\begin{pmatrix} -1 & 3 & x \\ 1 & 4 & y \\ 1 & 4 & z \end{pmatrix} \xrightarrow{\text{row reduce}} \text{find condition for consistency} \rightarrow \text{eq'n for plane}$$