MA322-007 Jan 27 quiz Name: Fixed

1.4.1 (HW1.4#25) Find scalars c_1, c_2, and c_3 such that

See Book!

$$\begin{bmatrix} -7 \\ -3 \\ 10 \end{bmatrix} = c_1 \begin{bmatrix} 4 \\ 5 \\ -6 \end{bmatrix} + c_2 \begin{bmatrix} -3 \\ -2 \\ 2 \end{bmatrix} + c_3 \begin{bmatrix} 1 \\ 5 \\ -3 \end{bmatrix}$$

$$\begin{bmatrix} 4 & -3 & 1 \\ 5 & -2 & 5 \\ -6 & 2 & -3 \end{bmatrix} \begin{bmatrix} -3 \\ -1 \\ 2 \end{bmatrix} = \begin{bmatrix} -7 \\ -3 \\ 10 \end{bmatrix} \text{ so } \begin{matrix} c_1 = -3 \\ c_2 = -1 \\ c_3 = 2 \end{matrix} \text{ works}$$

1.4.2 (HW1.4#13) Is $\vec{\mathbf{u}} = \begin{bmatrix} 0 \\ 4 \\ 4 \end{bmatrix}$ in the plane spanned by the columns of $A = \begin{bmatrix} 3 & -5 \\ -2 & 6 \\ 1 & 1 \end{bmatrix}$? Why or why not?

Yes

$$\left[\begin{array}{cc|c} 3 & -5 & 0 \\ -2 & 6 & 4 \\ 1 & 1 & 4 \end{array}\right] \xrightarrow[R_2+2R_3]{R_1-3R_3} \left[\begin{array}{cc|c} 0 & -8 & -12 \\ 0 & 8 & 12 \\ 1 & 1 & 4 \end{array}\right] \xrightarrow[R_2+R_1]{R_1/-8} \left[\begin{array}{cc|c} 0 & 1 & 1.5 \\ 0 & 0 & 0 \\ 1 & 1 & 4 \end{array}\right]$$

$$\xrightarrow{R_3-R_1} \left[\begin{array}{cc|c} 0 & 1 & 1.5 \\ 1 & 0 & 2.5 \end{array}\right] \text{ so } 2.5 \begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix} + 1.5 \begin{bmatrix} -5 \\ 6 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 4 \end{bmatrix}$$

1.5.1 Write the solutions to $A\vec{\mathbf{x}} = \vec{\mathbf{b}}$ in parametric form, $\vec{\mathbf{x}} = \vec{\mathbf{x}}_p + s\vec{\mathbf{x}}_1 + t\vec{\mathbf{x}}_2 + \ldots$. Here $A = \begin{bmatrix} 1 & 0 & 0 & 4 & 0 \\ 0 & 1 & 5 & 6 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$ and $\vec{\mathbf{b}} = \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix}$.

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 7 \\ 8 \\ 0 \\ 0 \\ 9 \end{bmatrix} + s \begin{bmatrix} 0 \\ -5 \\ 1 \\ 0 \\ 0 \end{bmatrix} + t \begin{bmatrix} -4 \\ -6 \\ 0 \\ 1 \\ 0 \end{bmatrix}$$

1.5.2 Write a vector equation of the plane that passes through $\underset{\vec{v}_1}{\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}}$, $\underset{\vec{v}_2}{\begin{bmatrix} 4 \\ 4 \\ 5 \end{bmatrix}}$, and $\underset{\vec{v}_3}{\begin{bmatrix} 9 \\ 8 \\ 7 \end{bmatrix}}$.

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + s \underbrace{\begin{bmatrix} 3 \\ 2 \\ 2 \end{bmatrix}}_{\vec{v}_2 - \vec{v}_1} + t \underbrace{\begin{bmatrix} 8 \\ 6 \\ 4 \end{bmatrix}}_{\vec{v}_3 - \vec{v}_1}$$

Remember Thursday Jan 29 is the first exam!