Math 265
Professor Priyam Patel
2/25/16

Class Handout #11

Recall from last time:

Exercise 7: In $\mathbb{R}^3$, let $\mathbf{v_1} = \begin{bmatrix}1\\2\\1\end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix}1\\0\\2\end{bmatrix}$ and $\mathbf{v_3} = \begin{bmatrix}1\\1\\0\end{bmatrix}$.

Determine whether $\{\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}\}$ spans $\mathbb{R}^3$. This is the same as checking whether every vector $\mathbf{v} = \begin{bmatrix}a\\b\\c\end{bmatrix} \in \mathbb{R}^3$ is a linear combination of $\mathbf{v_1}$, $\mathbf{v_2}$ and $\mathbf{v_3}$.

Exercise 8: In P_2, let $\mathbf{v_1} = t^2 + 2t + 1$ and $\mathbf{v_2} = t^2 + 2$. Does $\{\mathbf{v_1}, \mathbf{v_2}\}$ span P_2?

Section 4.5: Linear Independence

Leading question: What is the span of $\left\{ \begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix} \right\}$ and what is the span of $\left\{ \begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}, \begin{bmatrix}2\\3\\5\end{bmatrix} \right\}$?

Exercise 1: Let $\mathbf{v_1} = \begin{bmatrix}1\\0\\0\\1\end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix}0\\1\\3\\-1\end{bmatrix}$ and $\mathbf{v_3} = \begin{bmatrix}0\\0\\2\\4\end{bmatrix}$ in $\mathbb{R}^4$. Is the set of vectors

$S = \{\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}\}$ linearly dependent or linearly independent?

Exercise 1.5: Let $\mathbf{v_1} = \begin{bmatrix} 1 & 0 & 0 & 1 \end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix} 0 & 1 & 3 & -1 \end{bmatrix}$ and $\mathbf{v_3} = \begin{bmatrix} 0 & 0 & 2 & 4 \end{bmatrix}$ in $\mathbb{R}_4$. Is the set of vectors $S = \{\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}\}$ linearly dependent or linearly independent?

Exercise 2: Are the vectors $\mathbf{v_1} = t^2 + t + 2$, $\mathbf{v_2} = 2t^2 + t$ and $\mathbf{v_3} = t + 4$ in P_2 linearly dependent or linearly independent?

Exercise 3: Are the vectors $\mathbf{v_1} = \begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix}$, $\mathbf{v_2} = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$ and $\mathbf{v_3} = \begin{bmatrix} 0 & -3 \\ -2 & 1 \end{bmatrix}$ in M_{22} linearly dependent or independent?