MA 1111/1212: Linear Algebra
Tutorial problems, October 30, 2014

In problems 1–5, determine whether, for the given n, the vectors $\{v_i\}$ in $\mathbb{R}^n$ (i) are linearly independent; (ii) span $\mathbb{R}^n$; (iii) form a basis of $\mathbb{R}^n$.

1. $n = 2$, $v_1 = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$, $v_2 = \begin{pmatrix} 7 \\ -7 \end{pmatrix}$.

2. $n = 2$, $v_1 = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$, $v_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$.

3. $n = 2$, $v_1 = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$, $v_2 = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$, $v_3 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$.

4. $n = 3$, $v_1 = \begin{pmatrix} 2 \\ -1 \\ -1 \end{pmatrix}$, $v_2 = \begin{pmatrix} -1 \\ 2 \\ -1 \end{pmatrix}$, $v_3 = \begin{pmatrix} -1 \\ -1 \\ 2 \end{pmatrix}$.

5. $n = 3$, $v_1 = \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}$, $v_2 = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$, $v_3 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$.