Homework Sets 11 – 16

due Wed, Oct 3

due Fri, Oct 10.

Class date	**Section covered**	**HW assigned**
Monday Sept 24	3.2	11bc, 12a, 18, 19ab, 23, and 24.
	3.3	1ac, 2ad, 4c, 6, 8ac, 13, 14, 19.
Wednesday Sept 26	3.3	**Supplemental Problem 6** below
	3.4	2ad (refers to 2ad in Section 3.3), 3abc, 4, 5abc, 7, 8, 11, 14a, 15 For 7, take $a = 1$ and $b = c = 0$ to get a vector $\mathbf{v}_1$, etc.
Friday Sept 28	3.5	1–4, **Supplemental Problem 7** below.
Monday Oct 1	3.5	5, 6, 9a, 10, **Supplemental Problem 8** below.
Wednesday Oct 3	3.6	1, 3, 4ad, 6, 9 (use Rank-Nullity Theorem), 12 (use Theorems 3.61 & 3.61 for (a), give a 2×2 counterexample for (b), 19 (assume that $\mathbf{y} = \mathbf{0}$ and show that this leads to a contradiction), 26 (follow proof of Theorem 3.63a from class).

Supplemental Problems.

6. (a) Are the columns of $\begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix}$ linearly independent vectors in $V = \mathbb{R}^3$?

(b) Are the columns of $\begin{pmatrix} 1 & 2 & 3 & 1 \\ 4 & 5 & 6 & 0 \\ 7 & 8 & 9 & 0 \end{pmatrix}$ linearly independent vectors in $\mathbb{R}^3$? Can you answer without doing any row reduction?

7. Let $E = \{\mathbf{e}_1, \mathbf{e}_2\}$ be the standard basis of $\mathbb{R}^2$, and $B = \{\mathbf{b}_1, \mathbf{b}_2\}$ be the basis $\mathbf{b}_1 = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$, $\mathbf{b}_2 = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$.

(a) Find the transition matrices U_{EB} and U_{BE}.

(b) Use your answer to (a) to find the coordinates $[\mathbf{w}]_B$ of $\mathbf{w} = \begin{pmatrix} 3 \\ 7 \end{pmatrix}$ in the B-basis.

8. Let $E = \{\mathbf{e}_1, \mathbf{e}_2, \mathbf{e}_3\}$ be the standard basis of $\mathbb{R}^3$, and let $B = \{\mathbf{b}_1, \mathbf{b}_2, \mathbf{b}_3\}$ be the basis

$$\mathbf{b}_1 = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \qquad \mathbf{b}_2 = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix}, \qquad \mathbf{b}_3 = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}.$$

(a) Find the transition matrices U_{EB} and U_{BE}.

(b) Use your answer to (a) to find the coordinates $[\mathbf{w}]_B$ of $\mathbf{w} = \begin{pmatrix} 5 \\ -2 \\ 3 \end{pmatrix}$ in the B-basis.