The following exercises are from the corresponding sections of the UC Berkeley custom edition of Lay, Nagle, Saff, & Snider, Linear Algebra and Differential Equations. Note that the section numbers and problem numbers ARE NOT the same as in Lay, Linear Algebra.

Exercises 1.3: 14, 15

Exercises 1.5: 6, 7, 18, 24, 31

Exercises 1.7: 5, 11, 27, 33-38, 40

Exercises 1.8: 3, 12, 17, 25, 34

Exercises 1.9: 7, 11, 19, 27, 33

Optional Additional Problems: (you do not need to hand these in, but I suggest you try them.)

1. Prove that if a set $\{\vec{v}_1, \vec{v}_2, \ldots, \vec{v}_n\}$ is linearly dependent, then for some i between 1 and n, $\vec{v}_i$ is a linear combination of $\vec{v}_1, \ldots, \vec{v}_{i-1}$. (We discussed this in class; here I want you to try to write down all the details.)

2. Let $T\colon \mathbb{R}^n \to \mathbb{R}^m$ be a linear transformation. Suppose $\{\vec{u}, \vec{v}\}$ is a linearly independent set, but $\{T(\vec{u}), T(\vec{v})\}$ is a linearly dependent set. Show that the equation $T(\vec{x}) = \vec{0}$ has a non-trivial solution.

3. Explain why a set $\{\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4\}$ in $\mathbb{R}^5$ must be linearly independent when $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ is linearly independent and $\vec{v}_4$ is not in span$\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$.

4. Suppose $\vec{v}_1, \vec{v}_2, \vec{v}_3$ are distinct points on one line in $\mathbb{R}^3$ (the line need not pass though the origin). Show that $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ is linearly dependent.