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 4.7: 8, 9, 13, 20a

Exercises 5.1: 26, 27, 29, 31

Exercises 5.2: 13, 18, 19, 23

Exercises 5.3: 25, 27, 28, 29, 31

Additional Problems:

1. Find a formula for the characteristic polynomial of the matrix $n \times n$ matrix A_n in which every diagonal entry is 2 and every other entry is 1. For example,

$$A_5 = \begin{pmatrix} 2 & 1 & 1 & 1 & 1 \\ 1 & 2 & 1 & 1 & 1 \\ 1 & 1 & 2 & 1 & 1 \\ 1 & 1 & 1 & 2 & 1 \\ 1 & 1 & 1 & 1 & 2 \end{pmatrix}.$$

   Then use this formula to find the determinant of A_n. Think about (but you do not need to turn in) what happens if the constants are different, for example, 5's on the diagonal and 2's everywhere else. Try to come up with a general rule.

2. Let $P_{<n}$ be the space of polynomials $f(x)$ of degree $< n$, and define $T\colon P_{<n} \to P_{<n}$ by $T(f) = f + \frac{df}{dx}$. Verify that T is a linear transformation and $\ker(T) = \{\vec{0}\}$.