Textbook reading for this week:

- §4.1 (eigenvalues and eigenvectors) – pay particular attention to how to compute the eigenvalues and corresponding eigenvectors of a matrix.
- §4.2 – the main practical task here is to decide if a matrix is diagonalizable by finding the eigenvalues and a basis for each eigenspace. You should also understand the theoretical justification for why this is sufficient (4.2.7).

Study items:

- Calculate the determinant of an n × n matrix using row operations as appropriate to simplify the calculation.
- Use the determinant to decide if a matrix is invertible.
- Calculate the determinant of an $n \times n$ matrix using row operations as appropriate to simplify the calculation.
- Calculate determinants via cofactor expansion.
- Calculate the eigenvalues and eigenvectors of an $n \times n$ matrix.
- Calculate the eigenvalues and eigenvectors of a linear transformation $T : V \to V$.

Problems:

1. *(Damiano–Little 3.2.1(a,c))* (3×3 determinants by cofactor expansion)
2. *(Damiano–Little 3.2.2(b,c))* (3×3 determinants via row reduction)
3. *(Damiano–Little 3.2.4(b))* (For which choice of scalar is the matrix invertible?)
4. *(Damiano–Little Ch 3 Supplemental (pp. 160-161) 4(b))* (determinant of large matrix; is it invertible?)
5. *(Damiano–Little 4.1.1(b,c))* (verify that a vector is an eigenvector; what is the eigenvalue? In $\mathbb{R}^3$ and $P_3(\mathbb{R})$)
6. *(Damiano–Little 4.1.2(b,c))* (char. polynomial of the examples in 4.1.1)
7. *(Damiano–Little 4.1.3(b,d,f))* (find eigenvalues and bases of eigenspaces)
8. *(Damiano–Little 4.1.11(a))* (eigenvalues of an upper-triangular matrix)
9. *(Damiano–Little 4.1.13(a))* (if λ is an eigenvalue of A, then λ^n is an eigenvalue of A^n)
10. *(Damiano–Little 4.1.15(a))* (eigenvalues of involutions)