Math 224
Final Exam Topics

The final exam will be largely computational, and will consist of (at least) the following types of questions.

1. Solve a linear system. Some relevant review problems are: 1.4 #13-24.
2. Find a basis for the column space, nullspace, and row space of a given matrix. I could ask you to find an orthogonal or orthonormal basis for one of these spaces. Some relevant review problems are: 2.2 #1-6. Also review how to find an orthogonal or orthonormal basis for a space.
3. Find the matrix representation of a linear transformation $T : \mathbb{R}^m \to \mathbb{R}^n$. Some relevant review problems are: 2.3 #5-11, 13-20.
4. Compute the determinant of different matrices using known determinants and properties of determinants. Some relevant review problems are: 4.2 #15-25.
5. Compute the eigenvalues and eigenvectors of a given matrix. Use the eigenvalues and eigenvectors to diagonalize the matrix and find a closed-form expression for the k-th power of the matrix. Some relevant review problems are: 5.1 #2-16; 5.2 #1-12.
6. Solve a system of linear differential equations using eigenvalue methods. Some relevant review problems are: 5.3 #6-13.
7. Compute the projection of a given vector in $\mathbb{R}^n$ on a subspace W. Some relevant review problems are: 6.1 #1-3, 5-7, 9, 11, 13, 14, 15, 17, 20, 21; 6.2 #1-4; 6.4 #1-4, 7, 8.
8. Compute the coordinate vector of a given vector in a vector space V relative to some ordered basis. Some relevant review problems are: 3.3 #1-9, 11, 12.
9. Find the matrix representation of a linear transformation $T : V \to V'$ where V and V' are two vector spaces. Some relevant review problems are: 3.4 #20, 21, 23, 26, 27.
10. There will be two "proof" questions. One will be on projections using an orthogonal basis, and one will be on eigenvalues.