Math 203-003 Topics for Test 1 (Covering Sections 1.1-1.5, 1.7, 1.8)

1. Solve a system of equations (Does a solution exist? Is the solution unique?)

2. Solve a vector equation (Does a solution exist? Is the solution unique?)

3. Solve a matrix equation (Does a solution exist? Is the solution unique?)

4. Find the Reduced Echelon Form of a matrix.

5. Recognize pivots, pivot columns, free variables and basic variables.

6. Write a solution in general form

7. Write a solution in parametric vector form

8. **Linear Combinations**

   - Calculate a linear combination of vectors
   - Determine whether you can write a given vector as a linear combination of a given set of vectors; if so, find the weights.

9. **Span** of a set of vectors

   - Determine whether a given vector is in the span of a given set of vectors.
   - Determine whether a set of vectors spans all of R^n

10. **Homogeneous** system of equations, vector equation and matrix equation. We know there is at least one solution, but are there more? Do non-trivial solutions exist?

11. Determine whether a given set of vectors (or the columns of a given matrix) are **linearly independent**. If they are not, find a dependence relation.

12. **Linear transformations**

   - Find the image of a given vector under a linear transformation
   - Determine whether a given vector is in the range of the transformation. If so, find a vector in the domain that maps onto it.