1. What is the SVD of a matrix A and describe each part?  Give one way it can be computed.

2. Show that the $\|x\|_\infty \le \|x\|_2$ where x is an m vector.

3. Define the characteristics of the following:

    a. Hermitian
    b. Symmetric
    c. Unitary
    d. Orthogonal

4. a. Compare contrast the Gram-Schmidt Classical and Modified
    b. Compute 1 loop of the modified Gram-Schmidt for the following 3 x 2 matrix.

$$A = \begin{bmatrix} 2 & 0 \\ 1 & 1 \\ 3 & 0 \end{bmatrix}$$

    Then describe the process to complete the algorithm.

5. If P is an orthogonal projector then I-2P is unitary.  Prove this algebraically, and give a picture of the geometric interpretation.


6. Why is the Gram-Schmidt referred to as a triangular Orthogonalization and conversely why is the householder process referred to as Orthogonal Triangularization?

7. a. What is an inner product?  What is an outer product?  What is the significance of an outer product?
    b. List the three bilinearity rules.
    c. What is the matrix representation of a linear transformation?

8. a. Define the Range(A) and the Nullspace(A).  What is the relationship between the two?
    b. Express matrix multiplication in terms of column vectors.

9. What is the advantage of the least squares fitting?