MATH 307

Individual HW 13

Instructions: Read textbook pages 65 to 67 before working on the homework problems. Show all steps to get full credits.

1. Let Q be an arbitrary unitary matrix of size 3×3,

$$x = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, y = \begin{pmatrix} -3 \\ 0 \\ 1 \end{pmatrix},$$

   find the angle between Qx and Qy.

2. Prove that the null space of $A \in F^{m \times n}$ is a subspace of F^n.

3. Let

$$A = \begin{pmatrix} 1 & 2 \\ 1 & 2 \end{pmatrix},$$

   find a basis for its range $range(A)$.

4. Prove range$(AB) \subseteq$ range(A) for appropriate A, B that could be multiplied together.