1. #10 §6.4, p. 408 : Find an orthogonal basis for the columns of the matrix
   \[ A = \begin{pmatrix} -1 & 6 & 6 \\ 3 & -8 & 3 \\ 1 & -2 & 6 \\ 1 & -4 & -3 \end{pmatrix}. \]

2. #14, §6.4, p. 408 : The columns of \( Q \) were obtained by the Gram-Schmidt process of the columns of \( A \). Find an upper triangular matrix \( R \) such that \( A = QR \), given
   \[ A = \begin{pmatrix} -2 & 3 \\ 5 & 7 \\ 2 & -2 \\ 4 & 6 \end{pmatrix} \] and \( Q = \begin{pmatrix} -2/7 & 5/7 \\ 5/7 & 2/7 \\ 2/7 & -4/7 \\ 4/7 & 2/7 \end{pmatrix}. \]

3. #6, §6.5, p. 416 : Find the least-squares solution to \( Ax = b \), given \( A = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 1 \\ 1 & 0 & 1 \end{pmatrix} \) and \( b = \begin{pmatrix} 7 \\ 2 \\ 3 \\ 6 \\ 5 \\ 4 \end{pmatrix}. \)

4. #16, §6.5, p.417 : Use the factorization \( A = QR \) to find the least-squares solution of \( Ax = b \), given \( A = \begin{pmatrix} 1 & -1 \\ 1 & 4 \\ 1 & -1 \\ 1 & 4 \end{pmatrix} = \begin{pmatrix} 1/2 & -1/2 \\ 1/2 & 1/2 \\ 1/2 & -1/2 \\ 1/2 & 1/2 \end{pmatrix} \begin{pmatrix} 2 \\ 3 \end{pmatrix} \) and \( b = \begin{pmatrix} -1 \\ 6 \\ 5 \\ 7 \end{pmatrix}. \)

5. #10 , §6.7, p. 435: Let \( P_3 \) have the inner product given by evaluation at -3, -1, 1, and 3. Let \( P_0 = 1 \), \( p_1(t) = t \), and \( p(t) = t^2 \). First find a polynomial \( q \) that is orthogonal to \( p_0 \) and \( p_1 \). The find the best approximation to \( p(t) = t^2 \) by the polynomials in \( \text{Span}\{p_0, p_1, q\} \)