Linear Algebra

Homework #12 (Final homework)
Due Date:
Reading Assignment: Chapter 6
Problems:

1. Exercises 6.4–4
2. Exercises 6.4–16(e)
3. Exercises 6.4–17(f)
4. Exercises 6.4–18
5. Let $Q(x) = 3x_1^2 + 2x_2^2 + 2x_3^2 + 2x_1x_2 + 2x_1x_3 + 4x_2x_3$,
   a. find the maximum value of $Q(\mathbf{x})$ subject to the constraint $\mathbf{x}^T\mathbf{x} = 1$;
   b. find a unit vector $\mathbf{u}$ where the maximum value is attained;
   c. find the maximum value of $Q(\mathbf{x})$ subject to the constraint $\mathbf{x}^T\mathbf{x} = 1$ and $\mathbf{x}^T\mathbf{u} = 0$.
6. Find the SVD (Singular value decomposition) of $A = \begin{bmatrix} 7 & 1 \\ 0 & 0 \\ 5 & 5 \end{bmatrix}$.