Question 1 (25 Marks)

(a) Suppose A is a lower triangular matrix of the form

$$\begin{matrix} a & 0 & 0 \\ b & c & 0 \\ d & e & f \end{matrix}$$

State the transpose of A. Compute B where B = $A \times A^T$ B is a symmetric matrix. What is meant by this?

(b.) For a square matrix A show that:

(i) AA^T and $A + A^T$ are symmetric

(ii) $A - A^T$ is skew symmetric

(iii) A can be expressed as the sum of a symmetric matrix, $\frac{1}{2}(A + A^T)$ and a skew symmetric matrix $\frac{1}{2}(A - A^T)$