2a) A in terms of bidiagonal form can be written as

$$A = QBQ^T$$

$B \rightarrow$ bidiagonal matrix

$Q \rightarrow$ orthogonal matrix

$$A = Q(D-U)(D-U)^T Q^T \quad \text{— (1)}$$

Here, $D \rightarrow$ diagonal matrix with entries of B entries

$U \rightarrow$ diagonal matrix with off diagonal of B

Here, $(D+U)^T = D^T + U^T$

$$= D + U^T$$

Thus (1) becomes

$$A = \underbrace{Q(D-U)}(D+U^T)Q^T$$

Considering a new matrix V,

$$V = Q(D-U)$$

$$A = V(D+U^T)V^T$$

Algorithm

Set $V \equiv T$, traverse through the matrix,

$\rightarrow$ compute d_K of D,

$$d_K = \frac{a_{KK} - M^2_{(K-1,K)}}{d_{K-1}}$$

$$\rightarrow V_{KK} = \sqrt{d_K}$$

$$\rightarrow V_{k,k+1} = \frac{M_{k+1,k}}{V_{kk}}$$

Iterate through matrix to get

$U_{KK} = U_{KK}$

$$A = VDU^T V^T$$

$$= UDU^T$$