2(a) Exercise 5.2..

- $\upsilon_{12} = \alpha_{12}/\alpha_{22}$
- $\alpha_{11} = \alpha_{11} - \alpha_{22}\cdot\upsilon_{12}$
- $\alpha_{12} = \upsilon_{12}$

2(b) Exercise 6.1.

$$LDL^T = \begin{pmatrix} L_{00}D_{00}L_{00} & L_{00}D_{00}\cdot\lambda_{10}e_L & 0 \\ \lambda_{10}e_L^T\cdot D_{00}L_{00} & \lambda_{10}e_L^T D_{00}\lambda_{10}e_L+\delta_1 & \delta_1\lambda_{21}e_F^T \\ 0 & \delta_1\cdot\lambda_{21}e_F & \delta_1\lambda_{21}e_F\cdot\lambda_{21}\cdot e_F^T + L_{22}D_{22}L_{22} \end{pmatrix}$$

$$UEU^T = \begin{pmatrix} U_{00}E_{00}U_{00}+\upsilon_{01}e_L\epsilon_1\cdot\upsilon_{01}\cdot e_L^T & \upsilon_{01}e_L\epsilon_1 & 0 \\ \upsilon_{01}e_L^T\cdot\epsilon_1 & \epsilon_1+\upsilon_{12}e_F^T E_{22}\upsilon_{12}e_F & \upsilon_{12}e_F^T E_{22}U_{22} \\ 0 & U_{22}E_{22}\cdot\upsilon_{12}\cdot e_F & U_{22}E_{22}U_{22} \end{pmatrix}$$

* Twisted Factorization

$$WFW^T = \begin{pmatrix} L_{00}D_{00}L_{00} & L_{00}D_{00}\lambda_{10}e_L & 0 \\ \lambda_{10}e_L^T D_{00}L_{00} & \lambda_{10}e_L^T\cdot D_{00}\cdot\lambda_{10}e_L+\phi_1+\upsilon_{12}e_F^T E_{22}\cdot\upsilon_{12}e_F & \upsilon_{12}e_F^T E_{22}U_{22} \\ 0 & U_{22}E_{22}\cdot\upsilon_{12}e_F & U_{22}E_{22}U_{22} \end{pmatrix}.$$

$$\alpha_{11} = \overbrace{\lambda_{10}\cdot e_L^T D_{00}\lambda_{10}\cdot e_L}^{a}+\delta_1 \quad\Rightarrow a = \alpha_{11}-\delta_1$$

$$= \underbrace{\upsilon_{12}e_F^T E_{22}\cdot\upsilon_{12}e_F}_{b}+\epsilon_1 \quad\Rightarrow b = \alpha_{11}-\epsilon_1.$$

$$= a+\phi_1+b. \quad\Rightarrow \phi_1 = \alpha_{11}-a-b = \alpha_{11}-(\alpha_{11}-\delta_1)-(\alpha_{11}-\epsilon_1)$$

$$= \delta_1+\epsilon_1-\alpha_{11}$$

* Cost.

- Every element of WFW^T can be simply calculated or already known given that LDL^T & UEU^T are known. $O(1)$ for one twisted factorization
- For all twisted factorization, it will be $O(n)$