

$$\bullet V_{12} = \alpha_{12} / \alpha_{22}$$

$$\bullet \alpha_{11} = \alpha_{11} - \alpha_{22} \cdot V_{12}$$

$$\bullet \alpha_{12} = V_{12}$$

2(a)

Exercise 5.2.

2(b)

Exercise 6.1

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

$$UEU^T = \begin{pmatrix} U_{00} E_{00} U_{00} + v_{01} e_L e_1 \cdot v_{01} e_L^T & v_{01} e_L e_1 & 0 \\ v_{01} e_L^T \cdot e_1 & e_1 + v_{12} e_F^T E_{22} v_{12} e_F & v_{12} e_F^T E_{22} v_{12} \\ 0 & v_{12} E_{22} \cdot v_{12} e_F & v_{12} E_{22} v_{12} \end{pmatrix}$$

* Twisted Factorization

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

$$\alpha_{11} = \underbrace{\lambda_{10} e_L^T D_{00} \lambda_{10} e_L + \delta_1}_a \Rightarrow a = \alpha_{11} - \delta_1$$

$$= \underbrace{v_{12} e_F^T E_{22} \cdot v_{12} e_F + \epsilon_1}_b \Rightarrow b = \alpha_{11} - \epsilon_1$$

$$= a + \phi_1 + b$$

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

* 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 $O(n)$.