2(C)
Exercise 7.1.

$$\begin{pmatrix} L_{00}^T & \lambda_{10} e_L & 0 \\ 0 & 1 & 0 \\ 0 & \upsilon_{12} e_F & U_{22}^T \end{pmatrix} \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix} = \begin{matrix} L_{00}^T \cdot x_0 + \lambda_{10} e_L \cdot \chi_1 = 0 \quad -① \\ \chi_1 = 1 \\ \chi_1 \cdot \upsilon_{12} e_F + U_{22}^T \cdot x_2 = 0 \quad -② \end{matrix}$$

① $L_{00}^T \cdot x_0 + \lambda_{10} e_L = 0$. $\Rightarrow x_0 = L_{00} \cdot (-\lambda_{10}) e_L = -\lambda_{10} \cdot L_{00} \cdot e_L = -\lambda_{10} \begin{pmatrix} 0 \\ \lambda_{m-2,m-1} \\ \lambda_{m-1,m-1} \end{pmatrix}$.

② $\upsilon_{12} e_F + U_{22}^T \cdot x_2 = 0$. $\Rightarrow x_2 = U_{22} \cdot (-\upsilon_{12}) e_F = -\upsilon_{12} U_{22} \cdot e_F$

$\Rightarrow -\upsilon_{12} \cdot \begin{pmatrix} \upsilon_{00} \\ \upsilon_{10} \\ 0 \end{pmatrix}$.

$$\Rightarrow x = \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix} = \begin{bmatrix} 0 \\ -\lambda_{10} \cdot \lambda_{m-2,m-1} \\ -\lambda_{10} \cdot \lambda_{m-1,m-1} \\ 1 \\ -\upsilon_{12} \cdot \upsilon_{00} \\ -\upsilon_{12} \cdot \upsilon_{10} \\ 0 \end{bmatrix}$$

* Cost.
- The cost of $-\lambda_{10} \cdot L_{00} \cdot e_L$ is given L is bidiagonal, $O(4)$ for each row in L (eg. $(\lambda_{10} \cdot 0 + \lambda_{11} \cdot 0) \cdot \lambda_{10})$ at most.
- So, it costs $4m$ at most to get $-\lambda_{10} \cdot L_{00} \cdot e_L$.
- The logic applies to $-\upsilon_{12} \cdot U_{22} \cdot e_F$.
- So, the total cost of getting x is $\approx O(n)$