

In the current Simplex tableau

2nd Row is not basic since 2 is the first element
 3rd Row 1, 1, 1, 1, 1, -1 is the first 1
 4th 1, 1, 1, 1, 1, 0.5 is the first 1.

hence basic element vectors are a_1 & a_5 with

$$g=1, h=e, n=0, m=0, b=0$$

$$\text{Now } \begin{bmatrix} f \\ p \end{bmatrix} = b^x = B^{-1}b = \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} 6 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \end{bmatrix} = \begin{bmatrix} f \\ p \end{bmatrix}$$

$$q = r_2 = C_2 - C_B^T B^{-1} a_2 = 1 - [a \ 0] \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 4 \end{bmatrix} = q \quad \text{--- (1)}$$

$$\text{but } a_2^x = B^{-1} a_2 \Rightarrow \begin{bmatrix} 2 \\ i \end{bmatrix} = \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} c \\ 3 \end{bmatrix} \Rightarrow \begin{bmatrix} 2 \\ i \end{bmatrix} = \begin{bmatrix} 0.5c \\ 0.5c+3 \end{bmatrix}$$

$$c=4 \text{ then } i=5$$

$$a_3^x = B^{-1} a_3 \Rightarrow \begin{bmatrix} -1 \\ j \end{bmatrix} = \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} d \\ e \end{bmatrix} = \begin{bmatrix} 0.5d \\ 0.5d+e \end{bmatrix}$$

$$d=-2 \text{ then } e=1+1=2$$

To find

$$C_B^T B^{-1} b = 2 \Rightarrow [a \ 0] \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} 6 \\ 1 \end{bmatrix} = 2$$

$$\Rightarrow [a \ 0] \begin{bmatrix} 3 \\ 4 \end{bmatrix} = 3a + 0 = 2 \Rightarrow a = \frac{2}{3}$$

$$\text{From (1)} \quad 1 - [3 \ 0] \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ 3 \end{bmatrix} = 1 - [3 \ 0] \begin{bmatrix} 2 \\ 4 \end{bmatrix} = 1 - 6 = -5$$

$$\text{similar to (1)} \quad = 1 - [3 \ 0] \begin{bmatrix} 2 \\ 5 \end{bmatrix} = 1 - 6 = -5$$

$$r_3 = d = C_3 - [3 \ 0] \begin{bmatrix} 0.5 & 0 \\ 0.5 & 1 \end{bmatrix} \begin{bmatrix} -1 \\ 1 \end{bmatrix} = -2 - 3 = -5$$

$$k = -[3 \ 0] \begin{bmatrix} 1 \\ 1 \end{bmatrix} = 3 \quad \square$$