Q6

$$B = \begin{bmatrix} 2 & 2 \\ -2 & 3 \end{bmatrix} \quad N = \begin{bmatrix} -2 & 1 & 3 \\ 0 & 2 & 1 \end{bmatrix} \quad C_B = \begin{bmatrix} 4 \\ -2 \end{bmatrix} \quad C_N = \begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix}$$

$$B^{-1} = \frac{1}{10}\begin{bmatrix} 3 & -2 \\ 2 & 2 \end{bmatrix} \qquad (B^T)^{-1} = \frac{1}{10}\begin{bmatrix} 3 & 2 \\ -2 & 2 \end{bmatrix}$$

$$B x_B^b = b \rightarrow x_B^b = B^{-1}b = \frac{1}{10}\begin{bmatrix} 3 & -2 \\ 2 & 2 \end{bmatrix}\begin{bmatrix} 4 \\ 2 \end{bmatrix} = \frac{1}{10}\begin{bmatrix} 8 \\ 12 \end{bmatrix} = \begin{bmatrix} 4/5 \\ 6/5 \end{bmatrix}$$

$$B^T z = C_B \rightarrow z = (B^T)^{-1}C_B = \frac{1}{10}\begin{bmatrix} 3 & 2 \\ -2 & 2 \end{bmatrix}\begin{bmatrix} 4 \\ -2 \end{bmatrix} = \frac{1}{10}\begin{bmatrix} 8 \\ -12 \end{bmatrix} = \begin{bmatrix} 4/5 \\ -6/5 \end{bmatrix}$$

$$r = C_N - N^T z = \begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix} - \begin{bmatrix} -2 & 0 \\ 1 & 2 \\ 3 & 1 \end{bmatrix}\begin{bmatrix} 4/5 \\ -6/5 \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix} - \begin{bmatrix} -8/5 \\ 4/5 - 12/5 \\ 12/5 - 6/5 \end{bmatrix} = \begin{bmatrix} 13/5 \\ 4 + 3/5 \\ 4/5 \end{bmatrix}$$

$\begin{bmatrix} 13/5 \\ 4 + 3/5 \\ 4/5 \end{bmatrix}$ When all rows of matrix $[r]$ are positive stop simplex method

$$x = \begin{bmatrix} 4/5 \\ 0 \\ 0 \\ 0 \\ 6/5 \end{bmatrix}$$

Note; $6/5$ is moved from the 2nd row to the last row, similar to moving rows in step 1.