**Q1.** Reduce the following system to Reduced Echelon form representing each elementary operation as matrix multiplication, solve it and write the solution in vector form. Identify the homogeneous and particular solutions.

$$\left(\begin{array}{ccc|c} 1 & 2 & 2 & 2 \\ 2 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 4 & 0 & 2 & 2 \end{array}\right)$$

**Q2.** Reduce the following system to Reduced Echelon form representing each elementary operation as matrix multiplication, solve it and write the solution in vector form. Identify the homogeneous and particular solutions.

$$\left(\begin{array}{cccccc|c} 2 & 2 & 0 & 4 & 5 & 1 & 1 \\ 3 & 0 & 8 & 2 & 15 & 3 & 0 \\ 1 & -2 & 0 & 4 & -5 & 8 & 0 \end{array}\right)$$

**Q3.** For each of the following systems reduce them to Reduced Echelon form representing each elementary operation as matrix multiplication, solve and write the solution in vector form. Identify the homogeneous and particular solutions.

$$\left(\begin{array}{ccc|c} 1 & 2 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & -2 & 0 & 0 \end{array}\right), \left(\begin{array}{ccc|c} 1 & 2 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & -2 & 0 & 0 \end{array}\right), \left(\begin{array}{ccc|c} 1 & 2 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & -2 & 0 & 1 \end{array}\right)$$

**Q4.** Find the inverse of $\begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \\ 1 & -2 & 0 \end{pmatrix}$.

**Q5.** Represent $\begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \\ 1 & -2 & 0 \end{pmatrix}$ as a product of elementary matrices.