Instructions. Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

Problem 1. (5 points) Write an augmented matrix for the following system of equations

$$\begin{aligned} 3x - 7y + 18z - w &= 4 \\ 7x + 2y - z + 91w &= 19 \\ 4x + z - w &= 17 \end{aligned}$$

Solution.

$$\left[\begin{array}{cccc|c} 3 & -7 & 18 & -1 & 4 \\ 7 & 2 & -1 & 91 & 19 \\ 4 & 0 & 1 & -1 & 17 \end{array}\right]$$ □

Problem 2. (3 points) What are the three elementary row operations?

Solution.

1. Switch any two rows.
2. Multiply any row by a nonzero number.
3. Add a multiple of one row to another. □

Problem 3. (2 points) Put the following matrix into row-echelon form.

$$\begin{bmatrix} 1 & 98129 & 2334 \\ 0 & 1 & 19 \\ 0 & 0 & 3 \end{bmatrix}$$

Solution. Multiply R_3 by $\frac{1}{3}$ to obtain

$$\begin{bmatrix} 1 & 98129 & 2334 \\ 0 & 1 & 19 \\ 0 & 0 & 1 \end{bmatrix}$$ □