Matrix Algebra
Gaussian Elimination
Extra Homework 4

Show all steps and identify each row operation in working the following problems.

1. Use back-substitution to find all solutions of the following systems.

   a)
   $$\begin{aligned} x - 2y &= 1 \\ y &= 4 \end{aligned}$$

   b)
   $$\begin{aligned} x + 2y + 3z &= 4 \\ y + 2z &= 3 \\ z &= 2 \end{aligned}$$

   c)
   $$\begin{aligned} x_1 - x_2 - x_3 + x_4 &= -1 \\ x_3 + 3x_4 &= 4 \\ x_4 &= 5 \end{aligned}$$

2. Use Gaussian elimination and back-substitution (if necessary) to find all solutions of the following systems.

   a)
   $$\begin{aligned} 2x + 2y + 4z &= 18 \\ x - y + 2z &= 5 \\ 3x - 3y + 2z &= 3 \end{aligned}$$

   b)
   $$\begin{aligned} x + 2y + 3z &= 4 \\ 2x + y - z &= 7 \\ x - y - 4z &= 3 \end{aligned}$$

   c)
   $$\begin{aligned} x + 2y + 3z &= 4 \\ 2x + y - z &= 7 \\ x - y - 4z &= 8 \end{aligned}$$

3. Put the following matrices in row-echelon form.

a)

$$\begin{pmatrix} 3 & 3 & 6 & -3 \\ 1 & 2 & 4 & 1 \\ 2 & 2 & 2 & 2 \end{pmatrix}$$

b)

$$\begin{pmatrix} 0 & 1 & 1 & 2 \\ 1 & 1 & 2 & 0 \\ 1 & 2 & 0 & 1 \end{pmatrix}$$