Homework 5 (Gauss-Jordan Elimination)

MA 103, Instructor: Jeffrey Horn, Winter 2017

Instructions

Read section Section 2.1 of Chapter 2 of our textbook. Answer the questions below. Show work for partial credit but be sure to indicate clearly your final answer! (e.g., put a box around it) Attach extra sheets of paper if you need more space.

Question 1.

Write the augmented matrix corresponding to the following set of equations:

$$\begin{aligned} x + 2y &= 8 \\ -4x - 9y &= 99 \end{aligned}$$

Question 2.

Write the augmented matrix corresponding to the following set of equations:

$$\begin{aligned} 30x - 22y + 7z &= 340 \\ 16x - 19y - 50z &= -213 \\ x + y + z &= 1 \end{aligned}$$

Question 3.

Write the system of linear equations corresponding to the following augmented matrix:

$$\left[\begin{array}{ccc|c} 1 & 4 & -7 & 44 \\ 0 & -12 & -1 & -5 \\ -1 & 15 & 0 & 111 \end{array}\right]$$

Question 4.

Carry out the indicated elementary row operations:

$$\left[\begin{array}{cc|c} 1 & 4 & -7 \\ -2 & -1 & -1 \end{array}\right] \quad \begin{array}{c} \longrightarrow \\ (R_2 + 2R_1) \end{array} \quad \left[\begin{array}{cc|c} & & \\ & & \end{array}\right]$$

Question 5.

Carry out the indicated elementary row operations:

$$\left[\begin{array}{cc|c} -3 & 14 & 10 \\ -6 & 12 & 458 \end{array}\right] \quad \begin{array}{c} \longrightarrow \\ (-\frac{1}{3}R_1) \end{array} \quad \left[\begin{array}{cc|c} & & \\ & & \end{array}\right]$$

Question 6.

State the next elementary row operation that should be performed in order to put the matrix below into diagonal form. Then perform the operation.

$$\left[\begin{array}{cc|c} 5 & 4 & -6 \\ 2 & -1 & -22 \end{array}\right] \quad \begin{array}{c} \longrightarrow \\ (\qquad\qquad) \end{array} \quad \left[\begin{array}{cc|c} & & \\ & & \end{array}\right]$$

Question 7.

State the next elementary row operation that should be performed in order to put the matrix below into diagonal form. Then perform the operation.

$$\left[\begin{array}{cc|c} 1 & 4 & -2 \\ 3 & -1 & 12 \end{array}\right] \quad (\qquad\qquad) \quad \longrightarrow \quad \left[\begin{array}{cc|c} & & \\ & & \end{array}\right]$$

Question 8.

State the next elementary row operation that should be performed in order to put the matrix below into diagonal form. Then perform the operation.

$$\left[\begin{array}{ccc|c} 0 & 14 & -2 & 77 \\ 3 & -1 & 12 & -10 \\ -8 & 23 & 5 & -1 \end{array}\right] \quad (\qquad\qquad) \quad \longrightarrow \quad \left[\begin{array}{ccc|c} & & & \\ & & & \\ & & & \end{array}\right]$$

Question 9.

Solve the linear system by Gauss-Jordan elimination:

$$\begin{aligned} x + 7y &= 8 \\ 4x - 2y &= 14 \end{aligned}$$

Question 10.

Solve the linear system by Gauss-Jordan elimination:

$$\begin{aligned} 2x - 2y + 3z &= 12 \\ x - 3y - 4z &= -2 \\ -6x + y + 3z &= 10 \end{aligned}$$