

1.1 and 1.2

MA2320 Skills Check 1

First and Last Name (please print) Schn

Instructions: This assignment is to help you and me assess understanding of course material. It is a NON calculator/computer quiz intended to take 20 minutes. You can use your textbook and class notes. You can make a two-sided 3"x5" note card for exams. You could make a practice note card for this quiz.

You can check your row reduction using a calculator or computer if you want. You should fix any problems that you find. You can take more than 20 minutes if you need it.

I took _____ minutes the first time through.

Upload the document to GradeScope when you are done.

1. (4 points) Consider the matrix given below along with its row equivalent row reduced counterpart to answer the following question. Circle the pivot positions in both matrices and put a box around each pivot column.

$$\begin{bmatrix} 4 & 8 & 6 & 2 & 9 \\ 7 & 3 & 3 & 7 & 7 \\ 6 & 2 & 2 & 6 & 0 \\ 2 & 3 & 5 & 4 & 7 \\ 6 & 4 & 8 & 10 & 2 \end{bmatrix} \sim \dots \sim \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

2. (2 points each) Classify each of the following matrices as either being in reduced echelon form, echelon form (but not reduced echelon form), or neither.

$$\begin{bmatrix} 1 & 0 & 3 & 6 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 4 \end{bmatrix}$$

EF

$$\begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & 4 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Reduced EF

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

Neither

3. (2 points each) Each of the these augmented matrices represents a reduced linear system. Indicate if the system has a unique solution (One), infinitely many solutions (Lots) or no solutions (None). Do NOT find solutions.

$$\left[\begin{array}{ccc|c} 2 & 3 & 0 & 2 \\ 0 & 1 & 2 & 5 \\ 0 & 0 & 6 & 4 \end{array} \right]$$

One

3 pivots

$$\left[\begin{array}{cccc|c} 1 & 1 & 2 & 3 & 3 \\ 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

Lots

1 free var

$$\left[\begin{array}{cccc|c} 3 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 3 & 3 \\ 0 & 0 & 0 & 0 & 8 \end{array} \right]$$

None

Last Eq inconsistent

$$\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 0 & 1 & 0 \end{array} \right]$$

One

2 pivots

4. Solve the following system of equations

$$\begin{aligned} x_1 - 3x_2 + x_3 &= 5 \\ x_2 + x_3 &= 2 \\ -x_1 + x_2 + 5x_3 &= 0 \end{aligned}$$

a. (1 point) Write down the augmented matrix associated with this system

$$\left[\begin{array}{ccc|c} 1 & -3 & 0 & 5 \\ 0 & 1 & 1 & 2 \\ -1 & 1 & 5 & 0 \end{array} \right]$$

b. (10 points) Implement the Row Reduction Algorithm to convert the matrix into reduced row echelon form. Put a box around the reduced row echelon form.

$$\left[\begin{array}{ccc|c} 1 & -3 & 0 & 5 \\ 0 & 1 & 1 & 2 \\ 0 & -2 & 5 & 5 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & -3 & 0 & 5 \\ 0 & 1 & 1 & 2 \\ 0 & 0 & 7 & 9 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & 0 & 0 & 50/7 \\ 0 & 1 & 0 & 5/7 \\ 0 & 0 & 1 & 9/7 \end{array} \right]$$

c. (3 points) Write the solution to the linear system in the space provided. If a variable is free, write "free" in the answer blank. If your system is inconsistent, write inconsistent.

$$x_1 = \underline{50/7}; \quad x_2 = \underline{5/7}; \quad x_3 = \underline{9/7}$$

d. (3 points) If your system is consistent, show work to check if your solution is correct. If your system is inconsistent, describe a strategy to go about checking your work.

$$\begin{aligned} 50/7 - 3(5/7) + 0 &= 5 \\ 5/7 + 9/7 &= 2 \\ -50/7 + 5/7 + 5(9/7) &= 0 \end{aligned}$$

5. Find the general solutions of the system with the following augmented matrix

$$\left[\begin{array}{ccc|c} 1 & -2 & -1 & 3 \\ 3 & -6 & -2 & 2 \end{array} \right]$$

a. (6 points) Implement the Row Reduction Algorithm to convert the matrix into reduced row echelon form. Put a box around the reduced row echelon form.

$$\sim \left[\begin{array}{ccc|c} 1 & -2 & -1 & 3 \\ 0 & 0 & 1 & -7 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & -2 & 0 & -4 \\ 0 & 0 & 1 & -7 \end{array} \right] \sim \begin{aligned} x_1 &= -4 + 2x_2 \\ x_2 &= \text{free} \\ x_3 &= -7 \end{aligned}$$

b. (3 points) Write the solution to the linear system in the space provided. If a variable is free, write "free" in the answer blank. If your system is inconsistent, write inconsistent.

$$x_1 = \underline{-4 + 2x_2}; \quad x_2 = \underline{\text{free}}; \quad x_3 = \underline{-7}$$