Name SOLUTIONS

Mathematics 1553

Quiz 2

Prof. Margalit

Section E1/Arjun E2/Qianli E3/Kemi E4/Martin E5/Bharat (circle one!)

8 September 2017

1. Which of the following matrices are in reduced row echelon form? Select all that apply.

A. $\begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$ (B.) $\begin{pmatrix} 0 & 1 & 0 & -1 \end{pmatrix}$ (C.) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

2. Suppose that we have a system of two linear equations in the variables x_1, x_2, x_3, and x_4 and that the reduced row echelon form of the associated augmented matrix is

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

Which are the free variables for this system of equations?

X_1, X_4

Give the solution to the system in terms of the free variables.

$X_1 = \text{free}$

$X_2 = -X_4$

$X_3 = 1 - X_4$

$X_4 = \text{free}$

Which of the following best describes the solution set?

(a) a point

(b) a line

(*(c)* a two-dimensional plane)

(d) none of the above

Turn the page!

Find the reduced row echelon form of the following matrix. Show the matrix obtained after each row operation (you do not need to spell out which row operation you used).

$$\begin{pmatrix} 1 & 2 & 1 \\ -2 & -3 & 1 \\ 3 & 5 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 2 & 1 \\ -2 & -3 & 1 \\ 3 & 5 & 0 \end{pmatrix} \xrightarrow{R2 \to R2+2R1} \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 3 \\ 3 & 5 & 0 \end{pmatrix} \xrightarrow{R3 \to R3-3R1} \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 3 \\ 0 & -1 & -3 \end{pmatrix}$$

$$\xrightarrow{R3 \to R3+R2} \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \end{pmatrix} \xrightarrow{R1 \to R1-2R2} \begin{pmatrix} 1 & 0 & -5 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \end{pmatrix}$$