جامعة بيرزيت
BIRZEIT UNIVERSITY

Department of Mathematics

Quiz 1

Linear Algebra (Math 234) **September 19, 2018**

Instructor: Dr. Ala Talahmeh **First Semester 2018/2019**

Name: _____ **Number:** _____ **Section: 2**

Question One (10 points). **(a)** Which of the following matrices are in **REF**? which are in **RREF**?

$$A=\begin{bmatrix}0&1\\0&0\\0&0\end{bmatrix}, \quad B=\begin{bmatrix}1&2&3&4\\0&0&1&2\end{bmatrix}$$

(RREF) (REF)

(b) Use **Gauss-Jordan reduction** to solve the following system

$$\begin{aligned} x_1+x_2+x_3+x_4 &= 0\\ 2x_1+x_2-x_3+3x_4 &= 0\\ x_1-2x_2+x_3+x_4 &= 0 \end{aligned}$$

the augmented matrix is $\left[\begin{array}{cccc|c}1&1&1&1&0\\2&1&-1&3&0\\1&-2&1&1&0\end{array}\right]$

$\xrightarrow[-R_1+R_3]{-2R_1+R_2}$ $\left[\begin{array}{cccc|c}1&1&1&1&0\\0&-1&-3&1&0\\0&-3&0&0&0\end{array}\right] \to \left[\begin{array}{cccc|c}1&1&1&1&0\\0&\textcircled{1}&3&-1&0\\0&-3&0&0&0\end{array}\right]$

$\xrightarrow[3R_2+R_3]{-R_2+R_1}$ $\left[\begin{array}{cccc|c}1&0&-2&2&0\\0&1&3&-1&0\\0&0&\textcircled{9}&-3&0\end{array}\right] \xrightarrow{\frac{1}{9}R_3} \left[\begin{array}{cccc|c}1&0&-2&2&0\\0&1&3&-1&0\\0&0&1&-\frac{1}{3}&0\end{array}\right]$

$\xrightarrow[-3R_3+R_2]{2R_3+R_1}$ $\left[\begin{array}{cccc|c}1&0&0&4/3&0\\0&1&0&0&0\\0&0&1&-1/3&0\end{array}\right]$

Good Luck

Let $x_4=t$ be free variable

$\Rightarrow x_1=-\frac{4}{3}t$

$x_2=0$

$x_3=\frac{1}{3}t$, $t\in\mathbb{R}$.

$\therefore$ Solution set $=\left\{\left(-\frac{4}{3}t, 0, \frac{1}{3}t, t\right) / t\in\mathbb{R}\right\}$.