

MATH 54 FALL 2017: DISCUSSION 205/208 QUIZ#1

GSI: CHRISTOPHER EUR, DATE: 9/1/2017

STUDENT NAME: Bad Euler

Problem 1. (4 points) Solve for the general solution of $A\vec{x} = \vec{b}$ where

$$A = \begin{bmatrix} 2 & 0 & 4 & 2 \\ 2 & 1 & 2 & 1 \end{bmatrix}, \quad \vec{b} = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$$

Problem 2. (6 points) Say for which values of h, k the following system has (a) no solution, (b) unique solution, (c) infinitely many solutions.

$$\begin{bmatrix} 1 & 1 \\ 0 & h \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} k \\ k \end{bmatrix}$$

$$\textcircled{1} [A:b] = \left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & -2 \\ 2 & 1 & 2 & 1 & 1 \end{array} \right] \sim \left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & -2 \\ 0 & 1 & -2 & -1 & 3 \end{array} \right] \sim \left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & -1 \\ 0 & 1 & -2 & -1 & 3 \end{array} \right]$$

$$\therefore \text{ soln: } \left\{ \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} \in \mathbb{R}^4 \mid \begin{array}{l} x_1 = -1 - 2x_3 - x_4 \\ x_2 = 3 + 2x_3 + x_4 \end{array} \right\} = \left\{ \begin{bmatrix} -1 - 2t - s \\ 3 + 2t + s \\ t \\ s \end{bmatrix} \mid t, s \in \mathbb{R} \right\}$$

$\textcircled{2}$ (a) If $h=0, k \neq 0$ then aug. col. pivot \Rightarrow no soln.

(b) If $h \neq 0$, then two pivots in coeff. matrix and last col. never pivot. So just $h \neq 0$ ($k \in \mathbb{R}$).

(c) If $h=0, k=0$ then second col. free & last col. not pivot so infinitely many soln.