

Quiz 1

Wednesday, February 8, 2021

MATH 231

Spring 2023

Problem 1. Given below is the reduced row echelon form of an augmented matrix associated to a linear system in the variables x_1, x_2, x_3 , and x_4 .

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

(a) List the basic variable(s).

$x_1, x_2, \text{ and } x_4$

(b) List the free variable(s).

x_3

(c) Write down the general solution to the linear system.

$$x_1 = -3t + 5$$

$$x_2 = -2t - 3$$

$$x_3 = t$$

$$x_4 = 0$$

(d) How many solutions does the linear system have?

∞ -many

(Turn Page Over)

Problem 2. Consider the matrix $\begin{bmatrix} 1 & -3 & -2 \\ 0 & h+2 & -7 \end{bmatrix}$.

- (a) Give a value of h for which the matrix above is the augmented matrix of a *consistent* linear system.

Any $h \neq -2$ will work.

- (b) Give a value of h for which the matrix above is the augmented matrix of an inconsistent linear system.

$$h = -2$$

Problem 3. Consider the following matrix:

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

- (a) **True or false:** the above matrix in row echelon form.

T

- (b) Explain why the above matrix is **not** in *reduced* row echelon form.

The second column has a nonzero entry other than the leading 1.

- (c) Use a single elementary row operation to find the reduced row echelon form of the above matrix.

Subtract 3 times the second row
from the first to get

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