

MAT 216 (Introduction to Matrix Algebra), Prof. Jim Swift
Worksheet 4 = Quiz 2: Systems of Linear Equations

Name: key

1. A system of 3 linear equations in 3 unknowns has an augmented matrix that can be reduced

to $\left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 1 & 4 & 5 \\ 0 & 0 & 0 & 0 \end{array} \right]$. The solution of the system is $(x, y, z) = (3 - 2z, 5 - 4z, z)$

\uparrow
 z is free

$$\begin{array}{lcl} x + 2z = 3 & \text{or} & x = 3 - 2z \\ y + 4z = 5 & & y = 5 - 4z \end{array}$$

2. Consider the system of linear equations

$$x + y = 5$$

$$x - 2y = -4$$

- (a) Write down the augmented matrix of the system.

$$\left[\begin{array}{cc|c} 1 & 1 & 5 \\ 1 & -2 & -4 \end{array} \right]$$

- (b) Reduce the augmented matrix to reduced row-echelon form.

$$\rightsquigarrow R_2 - R_1 \rightarrow R_2 \left[\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & -3 & -9 \end{array} \right]$$

$$\rightsquigarrow -\frac{1}{3}R_2 \rightarrow R_2 \left[\begin{array}{cc|c} 1 & 1 & 5 \\ 0 & 1 & 3 \end{array} \right]$$

$$\rightsquigarrow R_1 - R_2 \rightarrow R_1 \left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 3 \end{array} \right]$$

- (c) Write down the solution of the system. $(x, y) = (2, 3)$.