

MTH 201 – ASSIGNMENT 1

- (1) Solve by Gaussian elimination:
$$\left| \begin{array}{cccccc} x_1 & -7x_2 & & & +x_5 & = & 3 \\ & & x_3 & & -2x_5 & = & 2 \\ & & & x_4 & +x_5 & = & 1 \end{array} \right|.$$
- (2)
$$\left| \begin{array}{cccccc} & & & x_4 & +2x_5 & -x_6 & = & 2 \\ x_1 & +2x_2 & & & +x_5 & -x_6 & = & 0 \\ x_1 & +2x_2 & +2x_3 & & -x_5 & +x_6 & = & 2 \end{array} \right|$$
: Solve by Gaussian elimination:
- (3) The reduced row-echelon forms of the augmented matrices of three systems are given below. How many solutions does each system have?

$$a) \left[\begin{array}{ccc|c} 1 & 0 & 2 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 0 & 1 \end{array} \right] \quad b) \left[\begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & 6 \end{array} \right] \quad c) \left[\begin{array}{ccc|c} 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{array} \right].$$

- (4) Find the rank of the following matrices using Gaussian elimination.

$$a) \left[\begin{array}{ccc} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{array} \right] \quad b) \left[\begin{array}{ccc} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{array} \right] \quad c) \left[\begin{array}{ccc} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{array} \right].$$

- (5) Which of the following matrices are in RREF?

$$a) \left[\begin{array}{ccccc} 1 & 2 & 0 & 2 & 0 \\ 0 & 0 & 1 & 3 & 0 \\ 0 & 0 & 1 & 4 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{array} \right] \quad b) \left[\begin{array}{ccccc} 0 & 1 & 2 & 0 & 3 \\ 0 & 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right] \quad c) \left[\begin{array}{ccccc} 1 & 2 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 \end{array} \right] \quad d) [0 \ 1 \ 2 \ 3 \ 4].$$

- (6) Find all 4×1 RREF matrices.

- (7) For which values of a, b, c, d and e is $\left[\begin{array}{ccccc} 0 & a & 2 & 1 & b \\ 0 & 0 & 0 & c & d \\ 0 & 0 & e & 0 & 0 \end{array} \right]$ RREF?

- (8) How many pivot sequences are there for RREF matrices of size $2 \times 2, 3 \times 2, 2 \times 3$.