

$$A = \begin{pmatrix} 1 & 3 & 5 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{pmatrix}$$

- 1a) Assume  $A$  (above) is the augmented matrix for a linear system. List the lead variables for the system.
- 1b) Find the solution set of the system.
- 1c) Use GE to put the matrix in RREF.
- 2) Answer each part with “True” or “False”.
- a) A 3x3 matrix in RREF must have at least two ones .
  - b) An underdetermined system can not have a unique solution.
  - c) A homogeneous system with a non-trivial solution must have a free variable.
  - d) Every consistent system has the trivial solution.
  - e) A 3x2 system can have a unique solution.

**Answers and Remarks:** Problems 1 and 2 were each worth 30 points. After removing all scores below 30 (assuming these students may drop) the average was about 47/60. This is fairly normal for Quiz I, and probably a bit higher than future averages; since the material gets harder. Unofficial scale for Quiz I: A’s are 52-60, B’s are 46-51, C’s are 40-45, D’s are 34-39. Usually each letter (B, C and D anyway) will span 6 points and the class average will be in the C+ to B- range.

- 1a) The lead variables are  $x_1$ ,  $x_3$  and  $x_4$ .
- 1b)  $\{1 - 3\alpha, \alpha, 0, 0\}$ .
- 1c)

$$U = \begin{pmatrix} 1 & 3 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{pmatrix}$$

- 2) FTTFT