

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

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