

1) Use Gaussian elimination to put the following system into *reduced* row echelon form. Use matrix notation. Find the solution set, using α notation (if necessary) in your answer.

$$\begin{aligned}x_1 + x_2 + x_3 &= 1 \\2x_1 + 2x_2 + x_3 &= 4\end{aligned}$$

2) Write down the information in this traffic flow diagram as a 2x2 system of linear equations. Then solve it. Any valid method is OK, but remember to show your work.

3) Answer each part with “True” or “False”.

- a) A 2x3 matrix in RREF must have at least two 1's .
- b) An overdetermined system cannot have free variables.
- c) Any two inconsistent 2x5 systems (involving the same variables) are equivalent.
- d) An underdetermined system can have a unique solution.
- e) A homogeneous system in triangular form has only the trivial solution.

Remarks and Answers: The average of the top 25 scores was about 51 out of 60 (85 percent). Quiz 1 is easier than most (except maybe the TF), so the scale is a bit higher. Roughly, A's = 55 to 60, B's = 49 to 54, C's = 43 to 48, D's = 37 to 42. This is just an advisory (unofficial) scale; I'll give you more info on the scale as the term goes on, and decide on the official scale after the final exam.

1) The solution set is $S = \{(3-\alpha, \alpha, -2)\}$. You should use this same notation, or something pretty close. I suggest checking your answer (eg set $\alpha = 0$ and check that $(3,0,-2)$ works. Then maybe $\alpha = 1$). The RREF (without the vertical line) is:

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

2) The traffic diagram was on the board and had only two intersections. The first showed $\text{IN} = x_1 + 230$, and $\text{OUT} = 150 + x_2$. So, the first equation is $x_1 - x_2 = -80$. Similarly, the second simplifies to $x_2 = 130$. So, $x_1 = 50$. You can stop there (you've solved it), or you can write $S = \{(50, 130)\}$, using the notation of problem 1.

3) FFTFT