

NAME

Show all your work and reasoning for maximum credit. If you continue your work on another page, be sure to leave a note. Do not use a calculator, book, or any personal paper. You may ask about any ambiguous questions or for extra paper. If you use extra paper, hand it in with your exam.

1) Two sets of one-way streets intersect as shown [see the textbook, page 21]. The streets are marked with their average hourly volume of traffic, but some are not known. Set this problem up as a linear system of equations in standard form. You do not have to do any GE or solve it.

2) Solve the following system, using α notation (if necessary) in your answer.

$$\begin{aligned}x_1 + 3x_2 + x_3 &= 1 \\x_2 - x_3 &= 3\end{aligned}$$

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

- a) If A is a 3×5 matrix then $A\mathbf{x} = \mathbf{b}$ is overdetermined.
- b) If A is a 3×5 matrix in REF then $a_{32} = 0$.
- c) Interchanging two equations in a system is a Type I operation.
- d) If A is nonsingular, then $A\mathbf{x} = \mathbf{b}$ is consistent.
- e) A homogeneous system with a nonzero solution has infinitely many solutions.

Answers:

1) See the example on page 21, and the matrix at the top of page 22. But your answer should be in equation form, so write $x_1 - x_2 = 160$ etc (4 equations).

2) This is already in REF, and $x_3 = \alpha$ is free. From Back Sub., we get

$$\{(-8 - 4\alpha, 3 + \alpha, \alpha)\}$$

3) FTTTT (you can ask me about these, of course).