

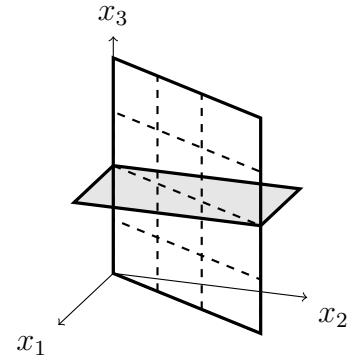
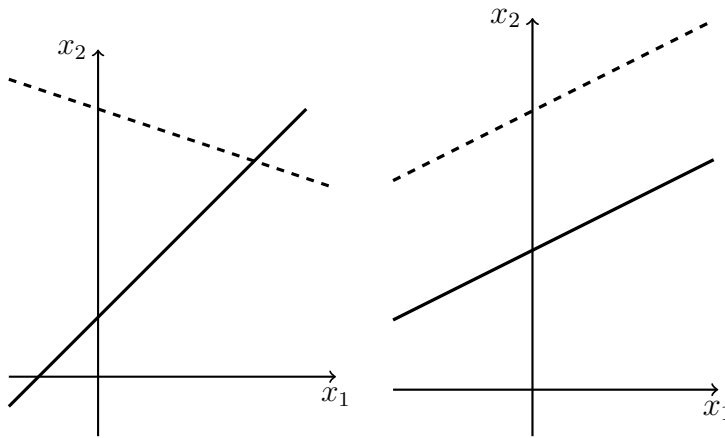
This is a two-stage quiz. You will receive this back with each question graded pass/fail in our next class meeting. You have until the date specified above to submit corrections for partial credit.

1. (5 points) Below you will find three linear systems with corresponding figures. In each the solid graph is determined by the first equation and the dashed graph by the second. For each system, specify whether it is consistent or inconsistent *and* specify how many solutions it has.

$$\text{I: } \begin{cases} -x_1 + x_2 = 2 \\ x_1 + 3x_2 = 27 \end{cases}$$

$$\text{II: } \begin{cases} -x_1 + 2x_2 = 6 \\ -x_1 + 2x_2 = 12 \end{cases}$$

$$\text{III: } \begin{cases} 2x_3 = 1 \\ -x_1 + \frac{x_2}{\sqrt{3}} = 27 \end{cases}$$



Systems I and III are consistent.

I has a single solution.

III has infinitely many solutions.

System II is inconsistent.

2. (5 points) Consider the following linear system

$$\begin{aligned}x_1 - 3x_3 &= 8 \\2x_1 + 2x_2 + 9x_3 &= 7 \\x_2 + 5x_3 &= -2\end{aligned}$$

(i) Give the corresponding coefficient matrix and the corresponding augmented matrix.

$$\begin{bmatrix} 1 & 0 & -3 \\ 2 & 2 & 9 \\ 0 & 1 & 5 \end{bmatrix} \quad \begin{bmatrix} 1 & 0 & -3 & 8 \\ 2 & 2 & 9 & 7 \\ 0 & 1 & 5 & -2 \end{bmatrix}$$

(ii) Below is an echelon form of the augmented matrix for this system.

$$\begin{bmatrix} 1 & 0 & 1 & 4 \\ 0 & 1 & -2 & 5 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

Use this to solve the system, i.e. describe all solutions to the system or justify why there are none.

$$\begin{bmatrix} 1 & 0 & 1 & 4 \\ 0 & 1 & -2 & 5 \\ 0 & 0 & 1 & -1 \end{bmatrix} \begin{array}{l} R1: R1 - R3 \\ \sim \\ R2: R2 + 2R3 \end{array} \begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

$$\begin{cases} x_1 = 5 \\ x_2 = 3 \\ x_3 = -1 \end{cases}$$

This is the only solution.