1. A company produces three items: aprons, bags and coasters. The company wants to know how long it takes to produce each item.

1 / 1 point

- On the first day, the company spent 5 hours to make 5 aprons, 10 bags, and 10 coasters.
- On the second day, the company spent 7 hours to make 10 aprons, 5 bags, and 15 coasters.
- On the third day, the company spent 6 hours to make 4 aprons, 6 bags, and 5 coasters.

Which of the following systems of equations represents the correct information in the above system of sentences?

○
$$\begin{cases} 5a + 10b + 10c = 5 \\ 10a + 5b + 15c = 7 \end{cases}$$

○
$$\begin{cases} 5a + 10b + 10c = 0 \\ 10a + 5b + 15c = 0 \\ 4a + 6b + 5c = 0 \end{cases}$$

○
$$\begin{cases} 10b + 5b + 6b = 5 \\ 5a + 10a + 4a = 7 \\ 10c + 15c + 5c = 6 \end{cases}$$

◉
$$\begin{cases} 5a + 10b + 10c = 5 \\ 10a + 5b + 15c = 7 \\ 4a + 6b + 5c = 6 \end{cases}$$

Correct

There are three sentences and this system of equations has three equations, this is the first check. The first sentence corresponds to the first equation since $5a$ to 5 aprons, $10b$ corresponds to 10 bags, and $10c$ to 10 coasters. Finally, the total purchase value is 5, matching to the first equation $5a + 10b + 10c = 5$. The same reasoning matches the next two sentences and equations. You may review the lecture on [System of equations.](#)

2. Consider the following system of equations: 1 / 1 point

$$\begin{cases} 3x + 2y + z = 10 \\ x + y + 2z = 5 \\ 5x - 6y + 3z = 2 \end{cases}$$

Which of the following matrices can be used to study the singularity of the system of equations above?

- (selected) $\begin{bmatrix} 3 & 2 & 1 \\ 1 & 1 & 2 \\ 5 & -6 & 3 \end{bmatrix}$
- $\begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 0 \\ 2 & 1 & 0 \end{bmatrix}$
- $\begin{bmatrix} 3 & 2 \\ 1 & 1 \\ 5 & -6 \end{bmatrix}$
- $\begin{bmatrix} 3 & 2 & 1 & 10 \\ 1 & 1 & 2 & 5 \\ 5 & -6 & 3 & 2 \end{bmatrix}$

Correct
You've obtained this matrix by stacking horizontally every constant term of every unkown variable in the system of equations. This is the matrix that you can use to study the singularity of the system.

3. Calculate the determinant of the following matrix: 1 / 1 point

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ -1 & 2 & 1 \end{bmatrix}$$

Hint: To find the determinant, apply the method described in the lecture [The determinant (3x3)]

- -2. Singular.
- (selected) -2. Non-singular.
- 0. Singular.
- 2. Singular.

Correct
You have correctly calculated the determinant and identified the non singularity of the matrix.

4. Determine if the following matrix has linearly dependent or independent rows.

1 / 1 point

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 2 & 2 & 1 \end{bmatrix}$$

- Linearly dependent.
- It cannot be determined.
- (selected) Linearly independent.

Correct
The matrix has linearly independent rows. You cannot obtain one row by using row operations on the other rows. If you calculate the determinant of this matrix you'll also find it is not equal to 0, another indication that the matrix is non-singular and that the rows are independent.

5. Consider the following matrix.

1 / 1 point

$$\begin{bmatrix} 2 & 1 & 5 \\ 1 & 2 & 1 \\ \mathbf{x} & \mathbf{y} & \mathbf{z} \end{bmatrix}$$

For which values x, y, and z does the matrix have linearly dependent rows?

- $x = 1, y = 3, z = 3$
- (selected) $x = 3, y = 3, z = 6$
- $x = 1, y = 2, z = 3$

Correct
By adding the first two rows, you get the values $x = 3$ by $(2 + 1), y = 3$ by $(1 + 2)$, and $z = 6$ by $(5 + 1)$. For these values, the matrix has linearly dependent rows.

6. Calculate the determinant of the following matrix.

1 / 1 point

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 2 \\ 1 & 4 & 5 \end{bmatrix}$$

- $\det(A) = 5$. The matrix is non-singular.
- (selected) $\det(A) = 0$. The matrix is singular.
- $\det(A) = 0$. The matrix is non-singular.

Correct
Correct! The determinant for the given matrix is 0, therefore the matrix is singular.

7. Select which of the following are true for **non-singular matrices**.

1 / 1 point

- [ ] In a non-singular matrix, one row can be a multiple of another one.
- [ ] In a non-singular matrix, rows are linearly dependent.
- [x] In a non-singular matrix there is only a unique solution for the represented system of equations.

> **Correct**
> Since the rows are linearly independent in the non-singular matrix, you can find a unique solution for the represented system of equations.

- [x] In a non-singular matrix, rows are linearly independent.

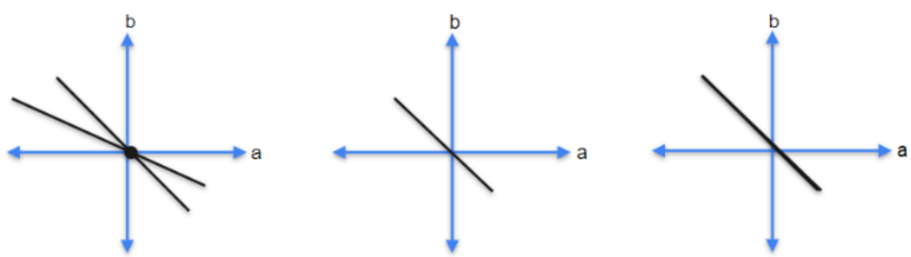
> **Correct**
> Non-singular matrices have linearly independent rows.

8. Choose the sequence of lines that represent a linear system such that the systems have, in this order:

1 / 1 point

1. zero solutions, 2. just one solution, 3. infinitely many solutions.

○



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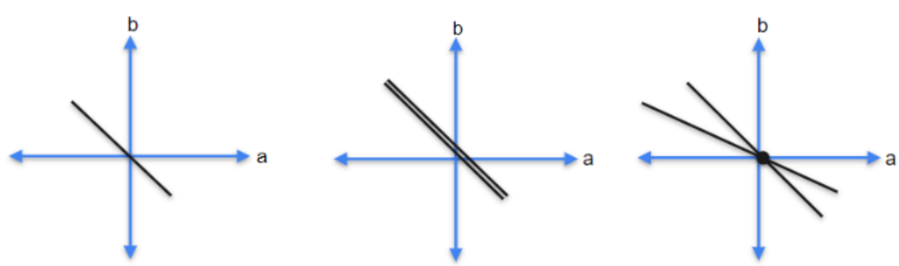
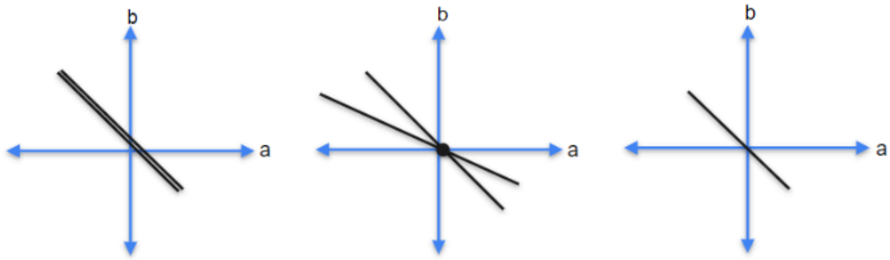


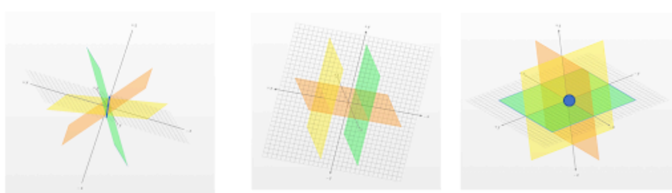


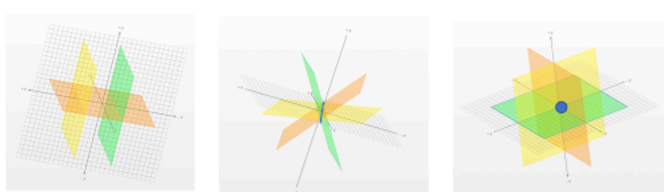
Correct
You can visually determine how many solutions a system of linear equations has by following these rules: If the lines are parallel, the system has no solutions; if the lines intersect at just one point, the system has just one solution and the solution is the point where they intersect. If the lines totally overlap, the system has infinitely many solutions.

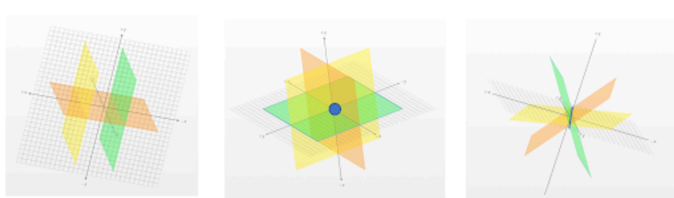
9. Select the correct sequence of graphs that represents a linear system with, respectively:

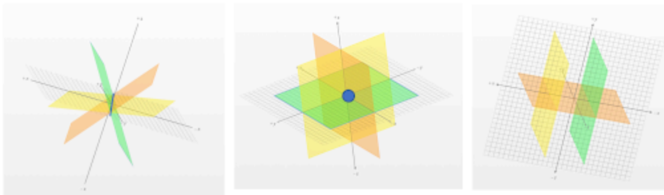
1 / 1 point

1. zero solutions, 2. just one solution, 3. infinitely many solutions.









Correct

The first graph has no solution because there is no place where the three planes intersect. The second graph has one solution, the origin $(0, 0, 0)$. And finally, you can see that in the third graph, there are infinitely many solutions (points where the lines intersect).