1. **(1 pt) Library/TCNJ/TCNJ_SolutionSetsLinearSystems-/problem8.pg**
Suppose the solution set of a certain system of equations can be described as $x_1 = 4-6t$, $x_2 = 4+6t$, $x_3 = 4t-3$, $x_4 = -6-4t$, where t is a free variable. Use vectors to describe this solution set as a line in $\mathbb{R}^4$.

$$L(t) = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} + t \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}.$$

2. **(1 pt) Library/NAU/setLinearAlgebra/HomLinEq.pg**
Solve the equation

$$-2x-4y-5z = 0$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = s \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} + t \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$$

3. **(1 pt) local/Library/UI/LinearSystems/ur_la_1_19AxB.pg**
Solve the system

$$\begin{cases} 4x_1 - 5x_2 + 2x_3 + 3x_4 = 0 \\ -x_1 + x_2 + 3x_3 + 2x_4 = 0 \\ 3x_1 - 4x_2 + 5x_3 + 5x_4 = 0 \\ 3x_1 - 3x_2 - 9x_3 - 6x_4 = 0 \end{cases}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} s + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} t.$$

Solve the system

$$\begin{cases} 4x_1 - 5x_2 + 2x_3 + 3x_4 = 3 \\ -x_1 + x_2 + 3x_3 + 2x_4 = 4 \\ 3x_1 - 4x_2 + 5x_3 + 5x_4 = 7 \\ 3x_1 - 3x_2 - 9x_3 - 6x_4 = -12 \end{cases}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} s + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} t.$$

If the matrix A corresponds to the coefficient matrix for the above system of equations, then given any vector $\vec{b}$, the matrix equation $A\vec{x} = \vec{b}$ will always has an infinite number of solutions.

- A. True
- B. False

4. **(1 pt) local/Library/UI/LinearSystems/ur_la_1_20vv3.pg**
Solve the system

$$\begin{cases} x_1 - 5x_2 - 2x_3 \quad - 2x_5 + 5x_6 = 0 \\ \quad -x_4 - 2x_5 - 4x_6 = 0 \\ x_1 - 5x_2 \quad + 4x_5 + 7x_6 = 0 \end{cases}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} s + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} t + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} u.$$

Solve the system

$$\begin{cases} x_1 - 5x_2 - 2x_3 \quad - 2x_5 + 5x_6 = 2 \\ \quad -x_4 - 2x_5 - 4x_6 = -7 \\ x_1 - 5x_2 \quad + 4x_5 + 7x_6 = 0 \end{cases}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} s + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} t + \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} u.$$

If the matrix A corresponds to the coefficient matrix for the above system of equations, then given any vector $\vec{b}$, the matrix equation $A\vec{x} = \vec{b}$ will always has an infinite number of solutions.

- A. True
- B. False

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5. **(1 pt) UI/Fall14/lin_span.pg**

Let $A = \begin{bmatrix} -15 \\ -2 \\ 33 \end{bmatrix}$, $B = \begin{bmatrix} 3 \\ 2 \\ -5 \end{bmatrix}$, and $C = \begin{bmatrix} 6 \\ 2 \\ -12 \end{bmatrix}$.

Which of the following best describes the span of the above 3 vectors?

- A. 0-dimensional point in R^3
- B. 1-dimensional line in R^3
- C. 2-dimensional plane in R^3
- D. R^3

Determine whether or not the three vectors listed above are linearly independent or linearly dependent.

- A. linearly dependent
- B. linearly independent

If they are linearly dependent, determine a non-trivial linear relation. Otherwise, if the vectors are linearly independent, enter 0's for the coefficients, since that relationship **always** holds.
$\_\_\_\_A + \_\_\_\_B + \_\_\_\_C = 0$.

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6. **(1 pt) UI/Fall14/lin_span2.pg**

Which of the following sets of vectors span R^3?

- A. $\begin{bmatrix} -7 \\ -4 \\ -8 \end{bmatrix}, \begin{bmatrix} 6 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} -9 \\ 0 \\ -3 \end{bmatrix}$
- B. $\begin{bmatrix} 3 \\ 1 \\ 6 \end{bmatrix}, \begin{bmatrix} -1 \\ -9 \\ 5 \end{bmatrix}$
- C. $\begin{bmatrix} 8 \\ -7 \end{bmatrix}, \begin{bmatrix} -4 \\ -2 \end{bmatrix}, \begin{bmatrix} 5 \\ 6 \end{bmatrix}$
- D. $\begin{bmatrix} 7 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} -8 \\ 9 \\ 0 \end{bmatrix}, \begin{bmatrix} -3 \\ -6 \\ 0 \end{bmatrix}$
- E. $\begin{bmatrix} -5 \\ -6 \end{bmatrix}, \begin{bmatrix} -5 \\ -6 \end{bmatrix}$
- F. $\begin{bmatrix} 4 \\ -5 \\ 8 \end{bmatrix}, \begin{bmatrix} -7 \\ -4 \\ -2 \end{bmatrix}, \begin{bmatrix} 11 \\ -1 \\ 10 \end{bmatrix}$

Which of the following sets of vectors are linearly independent?

- A. $\begin{bmatrix} -7 \\ -4 \\ -8 \end{bmatrix}, \begin{bmatrix} 6 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} -9 \\ 0 \\ -3 \end{bmatrix}$
- B. $\begin{bmatrix} 3 \\ 1 \\ 6 \end{bmatrix}, \begin{bmatrix} -1 \\ -9 \\ 5 \end{bmatrix}$
- C. $\begin{bmatrix} 8 \\ -7 \end{bmatrix}, \begin{bmatrix} -4 \\ -2 \end{bmatrix}, \begin{bmatrix} 5 \\ 6 \end{bmatrix}$
- D. $\begin{bmatrix} 7 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} -8 \\ 9 \\ 0 \end{bmatrix}, \begin{bmatrix} -3 \\ -6 \\ 0 \end{bmatrix}$
- E. $\begin{bmatrix} -5 \\ -6 \end{bmatrix}, \begin{bmatrix} -5 \\ -6 \end{bmatrix}$
- F. $\begin{bmatrix} 4 \\ -5 \\ 8 \end{bmatrix}, \begin{bmatrix} -7 \\ -4 \\ -2 \end{bmatrix}, \begin{bmatrix} 11 \\ -1 \\ 10 \end{bmatrix}$