1. **(1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/2.3.40.pg**

Let **S** be a set of m vectors in $\mathbb{R}^n$ with $m > n$.
Select the best statement.

- A. The set **S** is linearly independent, as long as it does not include the zero vector.
- B. The set **S** is linearly dependent.
- C. The set **S** is linearly independent, as long as no vector in **S** is a scalar multiple of another vector in the set.
- D. The set **S** is linearly independent.
- E. The set **S** could be either linearly dependent or linearly independent, depending on the case.
- F. none of the above

2. **(1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/2.3.41.pg**

Let A be a matrix with more rows than columns.
Select the best statement.

- A. The columns of A are linearly independent, as long as no column is a scalar multiple of another column in A
- B. The columns of A could be either linearly dependent or linearly independent depending on the case.
- C. The columns of A are linearly independent, as long as they does not include the zero vector.
- D. The columns of A must be linearly dependent.
- E. The columns of A must be linearly independent.
- F. none of the above

3. **(1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/2.3.42.pg**

Let A be a matrix with more columns than rows.
Select the best statement.

- A. The columns of A are linearly independent, as long as they does not include the zero vector.
- B. The columns of A could be either linearly dependent or linearly independent depending on the case.
- C. The columns of A must be linearly dependent.
- D. The columns of A are linearly independent, as long as no column is a scalar multiple of another column in A
- E. none of the above

4. **(1 pt) local/Library/UI/MatrixAlgebra/Euclidean/2.3.43.pg**

Let A be a matrix with linearly independent columns.
Select the best statement.

- A. The equation $A\mathbf{x} = \mathbf{0}$ always has nontrivial solutions.
- B. There is insufficient information to determine if such an equation has nontrivial solutions.
- C. The equation $A\mathbf{x} = \mathbf{0}$ has nontrivial solutions precisely when it has more rows than columns.
- D. The equation $A\mathbf{x} = \mathbf{0}$ never has nontrivial solutions.
- E. The equation $A\mathbf{x} = \mathbf{0}$ has nontrivial solutions precisely when it has more columns than rows.
- F. The equation $A\mathbf{x} = \mathbf{0}$ has nontrivial solutions precisely when it is a square matrix.
- G. none of the above

5. **(1 pt) local/Library/UI/MatrixAlgebra/Euclidean/2.3.44.pg**

Let A be a matrix with linearly independent columns.
Select the best statement.

- A. The equation $A\mathbf{x} = \mathbf{b}$ has a solution for all $\mathbf{b}$ precisely when it has more columns than rows.
- B. The equation $A\mathbf{x} = \mathbf{b}$ always has a solution for all $\mathbf{b}$.
- C. The equation $A\mathbf{x} = \mathbf{b}$ has a solution for all $\mathbf{b}$ precisely when it is a square matrix.
- D. The equation $A\mathbf{x} = \mathbf{b}$ never has a solution for all $\mathbf{b}$.
- E. There is insufficient information to determine if $A\mathbf{x} = \mathbf{b}$ has a solution for all $\mathbf{b}$.
- F. The equation $A\mathbf{x} = \mathbf{b}$ has a solution for all $\mathbf{b}$ precisely when it has more rows than columns.
- G. none of the above

6. **(1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/2.3.46.pg**

Let $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ be a linearly dependent set of vectors.
Select the best statement.

- A. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ is a linearly independent set of vectors unless $\mathbf{u}_4 = \mathbf{0}$.
- B. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ could be a linearly independent or linearly dependent set of vectors depending on the vectors chosen.
- C. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ is always a linearly independent set of vectors.

- D. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ is a linearly independent set of vectors unless $\mathbf{u}_4$ is a linear combination of other vectors in the set.
- E. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ is always a linearly dependent set of vectors.
- F. none of the above

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7. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/2.3.47.pg

Let $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ be a linearly independent set of vectors.
Select the best statement.

- A. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ is never a linearly independent set of vectors.
- B. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ could be a linearly independent or linearly dependent set of vectors depending on the vectors chosen.
- C. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ is always a linearly independent set of vectors.
- D. none of the above

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8. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/2.3.49.pg

Let $\mathbf{u}_4$ be a linear combination of $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$.
Select the best statement.

- A. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ could be a linearly dependent or linearly dependent set of vectors depending on the vectors chosen.
- B. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ is a linearly dependent set of vectors unless one of $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ is the zero vector.
- C. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ is always a linearly independent set of vectors.
- D. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3, \mathbf{u}_4\}$ is never a linearly independent set of vectors.
- E. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ is never a linearly dependent set of vectors.
- F. $\{\mathbf{u}_1, \mathbf{u}_2, \mathbf{u}_3\}$ could be a linearly dependent or linearly dependent set of vectors depending on the vector space chosen.
- G. none of the above

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9. (1 pt) Library/Rochester/setLinearAlgebra9Dependence-/ur_la_9_7.pg

The vectors

$$v = \begin{bmatrix} -1 \\ 0 \\ 3 \end{bmatrix}, \; u = \begin{bmatrix} -4 \\ -12 \\ 31+k \end{bmatrix}, \text{ and } w = \begin{bmatrix} -3 \\ -7 \\ 16 \end{bmatrix}.$$

are linearly independent if and only if $k \neq$ _____.

---

10. (1 pt) Library/TCNJ/TCNJ_LinearIndependence/problem3.pg

If k is a real number, then the vectors $(1,k),(k,3k+40)$ are linearly independent precisely when

$k \neq a,b,$

where $a =$ ___, $b =$ ___, and $a < b$.

---

11. (1 pt) Library/Rochester/setLinearAlgebra4InverseMatrix-/ur_la_4_2.pg

The matrix $\begin{bmatrix} 4 & -5 \\ -6 & k \end{bmatrix}$ is invertible if and only if $k \neq$ ___.

---

12. (1 pt) Library/Rochester/setAlgebra34Matrices/scalarmult3.pg

If $A = \begin{bmatrix} 1 & -2 & 1 \\ 0 & -4 & -1 \\ 3 & -1 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -3 & 3 \\ 1 & -2 & 2 \\ 1 & -1 & 2 \end{bmatrix}$, then

$2A - 3B = \begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$ and

$A^T = \begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$.

---

13. (1 pt) Library/Rochester/setAlgebra34Matrices/cubing_2x2.pg

Given the matrix $A = \begin{bmatrix} 4 & -3 \\ 0 & 3 \end{bmatrix}$, find A^3.

$A^3 = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$.

---

14. (1 pt) Library/maCalcDB/setLinearAlgebra3Matrices/ur_la_3_6.pg

If A and B are 6×2 matrices, and C is a 4×6 matrix, which of the following are defined?

- A. $C+B$
- B. CA
- C. $B+A$
- D. B^T
- E. $B^T C^T$
- F. AB

---

15. (1 pt) Library/NAU/setLinearAlgebra/m1.pg

Find the inverse of AB if

$A^{-1} = \begin{bmatrix} 3 & -2 \\ 3 & 5 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 2 & -3 \\ 2 & -1 \end{bmatrix}$.

$(AB)^{-1} = \begin{bmatrix} \_\_\_ & \_\_\_ \\ \_\_\_ & \_\_\_ \end{bmatrix}$

---

16. (1 pt) Library/Rochester/setLinearAlgebra4InverseMatrix-/ur_Ch2_1_4.pg

Are the following matrices invertible? Enter "Y" or "N".
You must get all of the answers correct to receive credit.

___1. $\begin{bmatrix} -5 & 0 \\ 0 & 5 \end{bmatrix}$

___2. $\begin{bmatrix} 25 & -8 \\ 0 & 0 \end{bmatrix}$

___3. $\begin{bmatrix} -7 & 6 \\ -1 & -2 \end{bmatrix}$

___4. $\begin{bmatrix} -5 & -8 \\ 25 & 40 \end{bmatrix}$

---

17. **(1 pt) Library/ASU-topics/set119MatrixAlgebra/p13.pg**

Consider the following two systems.

(a)

$$\begin{cases} x-3y &= 2 \\ -3x+3y &= -3 \end{cases}$$

(b)

$$\begin{cases} x-3y &= 3 \\ -3x+3y &= -3 \end{cases}$$

(i) Find the inverse of the (common) coefficient matrix of the two systems.

$$A^{-1} = \begin{bmatrix} \_\_\_\_ & \_\_\_\_ \\ \_\_\_\_ & \_\_\_\_ \end{bmatrix}$$

(ii) Find the solutions to the two systems by using the inverse, i.e. by evaluating $A^{-1}B$ where B represents the right hand side (i.e. $B = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$ for system (a) and $B = \begin{bmatrix} 3 \\ -3 \end{bmatrix}$ for system (b)).

Solution to system (a): $x =$ _____ , $y =$_____

Solution to system (b): $x =$ _____ , $y =$_____

---

18. **(1 pt) Library/ASU-topics/set119MatrixAlgebra/p13.pg**

Consider the following two systems.

(a)

$$\begin{cases} -2x+y &= -3 \\ 3x-y &= -3 \end{cases}$$

(b)

$$\begin{cases} -2x+y &= -2 \\ 3x-y &= -2 \end{cases}$$

(i) Find the inverse of the (common) coefficient matrix of the two systems.

$$A^{-1} = \begin{bmatrix} \_\_\_\_ & \_\_\_\_ \\ \_\_\_\_ & \_\_\_\_ \end{bmatrix}$$

(ii) Find the solutions to the two systems by using the inverse, i.e. by evaluating $A^{-1}B$ where B represents the right hand side (i.e. $B = \begin{bmatrix} -3 \\ -3 \end{bmatrix}$ for system (a) and $B = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$ for system (b)).

Solution to system (a): $x =$ _____ , $y =$_____

Solution to system (b): $x =$ _____ , $y =$_____

---

19. **(1 pt) Library/TCNJ/TCNJ_MatrixInverse/problem1.pg**

If

$$A = \begin{bmatrix} -3 & 4 \\ 1 & 7 \end{bmatrix},$$

then

$A^{-1} = \begin{bmatrix} \_\_\_\_ & \_\_ \\ \_\_\_\_ & \_\_ \end{bmatrix}$.

Given $\vec{b} = \begin{bmatrix} 1 \\ -4 \end{bmatrix}$, solve $A\vec{x} = \vec{b}$.

$\vec{x} = \begin{bmatrix} \_\_\_\_ \\ \_\_\_\_ \end{bmatrix}$.

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20. **(1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/3.3.42.pg**

A must be a square matrix to be invertible. [?]

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21. **(1 pt) Library/Rochester/setLinearAlgebra4InverseMatrix-/ur_la_4_11.pg**

If $A = \begin{bmatrix} -2e^{2t}\sin(4t) & -2e^{5t}\cos(4t) \\ -6e^{2t}\cos(4t) & 6e^{5t}\sin(4t) \end{bmatrix}$

then $A^{-1} = \begin{bmatrix} \_\_\_\_\_\_ & \_\_\_\_\_\_ \\ \_\_\_\_\_\_ & \_\_\_\_\_\_ \end{bmatrix}$.

---

22. **(1 pt) Library/maCalcDB/setLinearAlgebra4InverseMatrix-/ur_la_4_8.pg**

Determine which of the formulas hold for all invertible $n \times n$ matrices A and B

- A. $ABA^{-1} = B$
- B. $(A+B)(A-B) = A^2 - B^2$
- C. A^7B^6 is invertible
- D. $A+B$ is invertible
- E. $(I_n - A)(I_n + A) = I_n - A^2$
- F. $(A + A^{-1})^9 = A^9 + A^{-9}$