me me Assignment HW7fall14 due 10/16/2014 at 11:59pm CDT

1. (1 pt) local/Library/UI/Fall14/HW7_4.pg

Determine if the subset of \mathbb{R}^2 consisting of vectors of the form $\begin{bmatrix} a \\ b \end{bmatrix}$, where *a* and *b* are integers, is a subspace.

Select true or false for each statement.

The set contains the zero vector

- A. True
- B. False

This set is closed under vector addition

- A. True
- B. False

This set is closed under scalar multiplications

- A. True
- B. False

This set is a subspace

- A. True
- B. False

2. (1 pt) local/Library/UI/Fall14/HW7_5.pg

Determine if the subset of \mathbb{R}^3 consisting of vectors of the $\begin{bmatrix} a \end{bmatrix}$

form $\begin{bmatrix} a \\ b \\ c \end{bmatrix}$, where $a \ge 0, b \ge 0$, and $c \ge 0$ is a subspace.

Select true or false for each statement.

The set contains the zero vector

- A. True
- B. False

This set is closed under vector addition

- A. True
- B. False

This set is closed under scalar multiplications

- A. True
- B. False

This set is a subspace

- A. True
- B. False

3. (1 pt) local/Library/UI/Fall14/HW7_6.pg

If *A* is an $n \times n$ matrix and $\mathbf{b} \neq 0$ in \mathbb{R}^n , then consider the set of solutions to $A\mathbf{x} = \mathbf{b}$.

Select true or false for each statement.

The set contains the zero vector

- A. True
- B. False

This set is closed under vector addition

- A. True
- B. False

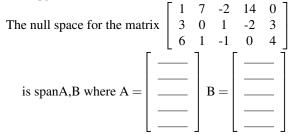
This set is closed under scalar multiplications

- A. True
- B. False

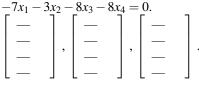
This set is a subspace

- A. True
- B. False

4. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/4.1.77.pg



5. (1 pt) Library/Rochester/setLinearAlgebra10Bases/ur_la_10_26.pg Find a basis of the subspace of \mathbb{R}^4 defined by the equation



6. (1 pt) local/Library/UI/6a.pg

The null space for the matrix $\begin{vmatrix} -1 \\ 4 \end{vmatrix}$



is [_____

7. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/4.2.32a.pg

Find a basis for the null space of matrix A.

	1	0	-4	5	1]
A =	0	1	0	1	0	
A =	0	0	0	1	3	

1

$$Basis = \begin{bmatrix} - & \\ - & \\ - & \\ - & \\ - & \end{bmatrix} \begin{bmatrix} - & \\ - & \\ - & \\ - & \\ - & \end{bmatrix}$$

8. (1 pt) local/Library/Rochester/setLinearAlgebra3Matrices-/ur_la_3_14.pg

Find the ranks of the following matrices.

$$rank \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 0 \end{bmatrix} = _$$
$$rank \begin{bmatrix} -1 & 0 & -4 \\ 1 & 6 & 0 \\ -9 & 0 & 0 \\ -9 & 0 & 0 \\ -4 & 0 & 4 \end{bmatrix} = __$$

9. (1 pt) local/Library/UI/Fall14/HW7_11.pg Find all values of x for which rank(A) = 2.

$A = \begin{bmatrix} x \\ x \end{bmatrix}$	2	1	0	7	1
A =	-2	2	х	-7	
	3	7	4	28	
x = -	-				
•	A4				

- B. -3
- C. -2
- D. -1
- E. 0
- F. 1
- G. 2
- H. 3
- I. 4
- J. none of the above

10. (1 pt) local/Library/UI/Fall14/HW7_12.pg

Suppose that A is a 8×6 matrix which has a null space of dimension 6. The rank of A=

- A. -4
- B. -3
- C. -2
- D. -1
- E. 0
- F. 1
- G. 2
- H. 3
- I. 4
- J. none of the above

Suppose *A* is a 5 \times 4 matrix. If rank of *A* = 1, then nullity of *A* =

- A. -4
- B. -3 • C. -2
- D. -1
- E. 0
- F. 1
- G. 2
- H. 3
- I. 4
- J. none of the above

The vector \vec{b} is NOT in *ColA* if and only if $A\vec{v} = \vec{b}$ does NOT have a solution

- A. True
- B. False

The vector \vec{b} is in *ColA* if and only if $A\vec{v} = \vec{b}$ has a solution

- A. True
- B. False

The vector \vec{v} is in *NulA* if and only if $A\vec{v} = \vec{0}$

- A. True
- B. False

If the equation $A\vec{x} = \vec{b_1}$ has at least one solution and if the equation $A\vec{x} = \vec{b_2}$ has at least one solution, then the equation $A\vec{x} = -1\vec{b_1} - 3\vec{b_2}$ also has at least one solution.

- A. True
- B. False

Hint: (*Instructor hint preview: show the student hint after 0 attempts. The current number of attempts is 0.*) Is *colA* a subspace? Is *colA* closed under linear combinations?

- A. True
- B. False

Hint: (*Instructor hint preview: show the student hint after 0 attempts. The current number of attempts is 0.*)

Is NulA a subspace? Is NulA closed under linear combinations?

If $\vec{x_1}$ and $\vec{x_2}$ are solutions to $A\vec{x} = \vec{0}$, then $8\vec{x_1} - 1\vec{x_2}$ is also a solution to $A\vec{x} = \vec{0}$.

If $\vec{x_1}$ and $\vec{x_2}$ are solutions to $A\vec{x} = \vec{b}$, then $2\vec{x_1} - 9\vec{x_2}$ is also a solution to $A\vec{x} = \vec{b}$.

- A. True
- B. False

Hint: (*Instructor hint preview: show the student hint after 0 attempts. The current number of attempts is 0.*)

Is the solution set to $A\vec{x} = \vec{b}$ a subspace even when \vec{b} is not $\vec{0}$? Is the solution set to $A\vec{x} = \vec{b}$ closed under linear combinations even when \vec{b} is not $\vec{0}$?

Suppose A is a 4×2 matrix. Then *nul* A is a subspace of R^k where k =

- A. -4
- B. -3
- C. -2
- D. -1
- E. 0
- F. 1
- G. 2
- H. 3
- I. 4
- J. none of the above

Suppose *A* is a 2 × 6 matrix. Then *col A* is a subspace of R^k where k =

- A. -4
- B. -3
- C. -2
- D. -1
- E. 0
- F. 1
- G. 2
- H. 3
- I. 4
- J. none of the above

20. (1 pt) Library/TCNJ/TCNJ_BasesLinearlyIndependentSet-/problem5.pg

Let W_1 be the set:

	[1]		1		1
e set:	0	,	1	,	1
	0		0		1

Determine if W_1 is a basis for \mathbb{R}^3 and check the correct answer(s) below.

- A. W_1 is a basis.
- B. W_1 is not a basis because it does not span \mathbb{R}^3 .
- C. W_1 is not a basis because it is linearly dependent.

Let
$$W_2$$
 be the set: $\begin{bmatrix} 1\\0\\1 \end{bmatrix}, \begin{bmatrix} 0\\0\\0 \end{bmatrix}, \begin{bmatrix} 0\\1\\0 \end{bmatrix}$.

Determine if W_2 is a basis for \mathbb{R}^3 and check the correct answer(s) below.

- A. W_2 is not a basis because it does not span \mathbb{R}^3 .
- B. W_2 is a basis.
- C. W_2 is not a basis because it is linearly dependent.

21. (1 pt) local/Library/UI/Fall14/HW7_25.pg

Indicate whether the following statement is true or false? If $S = \text{span}u_1, u_2, u_3$, then dim(S) = 3.

- A. True
- B. False

22. (1 pt) local/Library/TCNJ/TCNJ_BasesLinearlyIndependentSet-/3.pg

Check the true statements below:

- A. The columns of an invertible *n* × *n* matrix form a basis for ℝⁿ.
- B. If *H* = *Span*{*b*₁,...,*b*_{*p*}}, then {*b*₁,...,*b*_{*p*}} is a basis for *H*.
- C. If *B* is an echelon form of a matrix *A*, then the pivot columns of *B* form a basis for *ColA*.
- D. The column space of a matrix *A* is the set of solutions of *Ax* = *b*.
- E. A basis is a spanning set that is as large as possible.

23. (1 pt) local/Library/UI/4.3.1a.pg

Find bases for the column space and the null space of matrix A. You should verify that the Rank-Nullity Theorem holds. An equivalent echelon form of matrix A is given to make your work easier.

$$A = \begin{bmatrix} 1 & 2 & 12 \\ 3 & 3 & 21 \\ 3 & 8 & 46 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 5 \\ 0 & 0 & 0 \end{bmatrix}$$

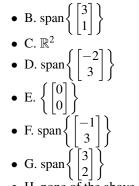
Basis for the column space of $A = \begin{bmatrix} - \\ - \\ - \\ - \end{bmatrix} \begin{bmatrix} - \\ - \\ - \\ - \end{bmatrix}$
Basis for the null space of $A = \begin{bmatrix} - \\ - \\ - \\ - \end{bmatrix}$

24. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/4.1.22.pg

Find the null space for $A = \begin{bmatrix} 3 & 2 \\ 1 & -9 \end{bmatrix}$. What is null(A)?

• A. span
$$\left\{ \begin{bmatrix} 1 \\ 3 \end{bmatrix} \right\}$$

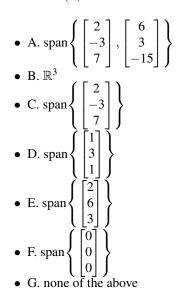
3



• H. none of the above

25. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/4.1.30.pg

Find the null space for
$$A = \begin{bmatrix} 2 & -3 & 7 \\ 6 & 3 & -15 \\ 3 & 5 & -18 \end{bmatrix}$$
.
What is null(*A*)?



•

Generated by ©WeBWorK, http://webwork.maa.org, Mathematical Association of America

26. (1 pt) Library/WHFreeman/Holt_linear_algebra/Chaps_1-4-/4.1.28.pg

Find the null space for
$$A = \begin{bmatrix} 2 & 6 \\ 7 & 21 \\ 4 & 12 \end{bmatrix}$$
.
What is null(A)?

• A.
$$\mathbb{R}^{3}$$

• B. span $\left\{ \begin{bmatrix} 0\\0\\0 \end{bmatrix} \right\}$
• C. \mathbb{R}^{2}
• D. span $\left\{ \begin{bmatrix} 12\\4 \end{bmatrix} \right\}$
• E. span $\left\{ \begin{bmatrix} -3\\1 \end{bmatrix} \right\}$
• F. span $\left\{ \begin{bmatrix} 2\\7\\4 \end{bmatrix} \right\}$
• G. span $\left\{ \begin{bmatrix} 0\\0 \end{bmatrix} \right\}$
• H. none of the above

27. (1 pt) local/Library/UI/4.3.3.pg

Find bases for the column space and the null space of matrix A. You should verify that the Rank-Nullity Theorem holds. An equivalent echelon form of matrix A is given to make your work easier.