Assignment 2

Due Date: 12 March 2015

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Determine whether the statement is true or false:

1. If each component of a vector in is *tripled*, then the norm of the vector is False
2. Vectors and are orthogonal to each other (where and are not zero). True
3. The initial point and terminal point of the vector are and respectively. True
4. The zero vector space has dimension. True
5. Any linearly independent set in a subspace is a basis for False
6. Let be vectors in the vector space Then the subset of all linear combination of these vectors is a subspace of True
7. The null space of A is the solution set of the equation. True
8. The column space of an matrix is in True
9. In the matrix transformation vectors and : False

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For Each Question, Choose the Correct Answer from the Multiple-Choice List.

1. If and are two vectors in (3-Space), then the vector is perpendicular to
2. only
3. only
4. both and
5. none of them.
6. If and are constants that are not all zero, then the equation represents
7. a plane passing through
8. a plane passing through
9. a line passing through
10. a line passing through
11. The set , together with the operation

 and the addition is the standard operation on is not a vector space because:

A linear combination formed by the vectors, and is:

Solve the following questions:

1. Find thecosine of the angle between the vectors and .

 = .

1. Calculate , where and

.

.

=10

1. Let be a subset of the vector space . Find a basis for

Let , and S is linearly independent. Hence is a basis for

1. Show that is a subspace of the vector space

Use Theorem 4.2.1 in week 6 PowerPoint slides.

Since W=.

* , is nonempty
* For every
* For every and
1. Let and . Find the domain, codomain and .

Domain for and is and the Codomain is also

=

= (10 )

= (.

Similarly,

1. Find the rank and nullity of the matrix . where

=

As performing elementary row operation do not change the null space. We convert to Reduced row echelon form.

, ,

,

,

Row echelon form

 .

Reduced row echelon form

The reduced row echelon form corresponds to the system:

 =t

=s

The solution can be written in the vector form:

Therefore the null space has a basis formed by the set .

Since we have: two free variables and

 *s* and *t*, and two vectors in the basis of the null space*.*  Then the nullity of the matrixis 2.

Form the dimension theorem: rank + nullity = .

As , the rank