Kingdom of Saudi Arabia
Ministry of Higher Education
Saudi Electronic University

المملكة العربية السعودية
وزارة التعليم العالي
الجامعة السعودية الالكترونية

Assignment NO. 2 week5-week7

Student Full Name:_____ .

Student ID:_____ .

CRN No:_____ .

Branch: _____.

Linear Algebra (Math-251)	Due Date Date: 24-03-2017

Total Points

True/False   ____/6

MCQ   ____/6

Short Answer   ____/18

Total   ____/30

Max Marks: 30

Section-I
State whether the following statements are true or false: [6X1=6]

1. Vectors $(2,1,3), (-2,-1,-3)$ are orthogonal to each other.

   (1)……..

2. If A is $m \times n$ matrix then row space of A and column space of A have same dimension.

   (2)……..

3. $T: \mathbb{R}^2 \rightarrow \mathbb{R}$, $T(x, y) = x - 6xy - 7y$ is a linear transformation.

   (3)……..

4. If A is a 3×3 invertible matrix then the columns of A form a basis for $\mathbb{R}^3$.

   (4)…….

5. The set $S = \{(1,2), (-6,3)\}$ is linearly independent.

   (5)…….

6. If S is a finite set of vectors in a vector space V and a basis for V then it must be linearly dependent and S spans V.

   (6)…….

Section-II

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

[6X1=6]

1. If $u = (3, -2,1)$ and $v = (4, -1,5)$ are two vectors in $\mathbb{R}^3$. Then the cross product $u \times v$ is
   a. $(12,2,5)$
   b. $(7, -3,6)$
   c. $(0,0,0)$
   d. $(-9, -11,5)$

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2. If $v = (4,2,-4)$ and $\|kv\| = 18$. Then the value of k is:
   a. -1
   b. 3
   c. 6
   d. 2

3. Let $S = \{v_1, v_2, v_3\}$ is a basis of V and v$= -2v_1 + 4v_2 - v_3$.
   Then the coordinate vector of v relative to S; ($(v)_s$) is :
   a. $(1,-2,4)$
   b. $(-2,4,-1)$
   c. $(-2,4)$
   d. $(2,-4,1$

4. A linear combination formed by the vectors w $= (7,2,6)$, v $= (3,1,4)$ and u $= (-1,0,2)$ is:
   a. $v = -3u - 3w$
   b. $u = v + 2w$
   c. $w = 2v - u$
   d. $v + u + w = 0$

4. If $u = (1,4,4)$ and $v = (3,2,6)$. Then the Euclidean distance $d(u,v) =$
   a. 35
   b. 12
   c. $\sqrt{12}$
   d. $\sqrt{35}$

6. If A is $m \times n$ matrix, then:
   a. $\text{rank}(A) = n$
   b. $\text{rank}(A) = m + n$
   c. $\text{rank}(A) = m \cdot n$
   d. $\text{rank}(A) \leq \min(m,n)$

Section-II (Multiple Choice Questions)

MCQ	1	2	3	4	5	6
Answers						

Section-III

Attempt all the questions: [6X3=18]

1. If $u = (4, 2, -4)$ and $v = (6, -12, -4)$. Find $cos\theta$, where θ is the angle between u and v.

2. Let W $= \left\{ \begin{bmatrix} -v + 3u \\ 5v \\ 4v - 2u \end{bmatrix}, \middle| v, u \in \mathbb{R} \right\}$ be a subset of $\mathbb{R}^3$. Find a basis for W.

3. Let W be the set of all vectors of the form $(a, 1, 1)$. Check if W is a subspace of $\mathbb{R}^3$ or not.

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4. Let $T(x, y) = (x, -2y, 3x - y)$, find the domain, codomain and the image of $(-4, -1)$.

5. Let $v_1 = (3,0,-6), v_2 = (-4,1,7)$ and $v_3 = (-2,1,5)$. Determine if $\{v_1, v_2, v_3\}$ is a basis for $\mathbb{R}^3$.

6. Given the 3×4 matrix. Find the basis for Row space of A and its dimension where

$$A = \begin{bmatrix} 1 & 4 & 2 & -3 \\ 3 & 7 & 6 & 1 \\ -2 & 0 & 1 & 20 \end{bmatrix}$$