| الكلية الجامعية بالجموم<br>قسم الرياضيات | اسم المقرر: الجبر الخطي (١)<br>رقم المقرر : ٢٣٠٤٢٢٤٣-٤<br>مدة الاختبار: ساعتان<br>السنة الدراسية :الفصل الدراسي الأول لعام ١٤٤١/١٤٤٢ هـ |
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| | اسم الطالبة: |
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***Second Midterm Exam (Monday 22 /4/1442 H)***

**Answer the following Questions**

**Question 1:**

Prove in full detail, with the standard operations in $R^2$, that the set $\{(x, 2x): x \text{ is real number}\}$ is a vector space (3 degrees)

**Question 2:**

In (a), and (b) W is not a subspace of the vector space. Verify this by giving a specific example that violates the test for a vector subspace:

(a) W is the set of all vectors in $R^3$ Whose third component is *-1* .

(b) W is the set of all matrices in $M_{n.n}$ such that $A^2 = A$ . ( 2 degrees)

**Question 3:**

(a) Determine whether the set $S = \{ (1,2,-2), (2,-1,1\}$ in $R^3$ is a linear combination of :

$(i)\ u = (1,-5,-5)$ $(ii)\ v = (-2,-6,6)$

$(iii)\ w = (-1,-22,22)$ $(v)\ z(-4,-3,3)$

(b) Determine whether the following matrices from $M_{2.2}$ form a linearly independent set:

$A = \begin{bmatrix} 1 & -1 \\ 4 & 5 \end{bmatrix}$ , $B = \begin{bmatrix} 4 & 3 \\ -2 & 3 \end{bmatrix}$ , $C = \begin{bmatrix} 1 & -8 \\ 22 & 23 \end{bmatrix}$ (4 degrees)

**Question 4:**

Explain why $S = \{2, x, x+3, 3x^2\}$ is not a basis for $P_2$ . (2 degrees)

**Question 5:**

Determine whether the function is a liner transformation or not:

**(a)** $T: R^2 \to R^2$ , $T(x,y) = (x,1)$.

**(b)** $T: M_{2.2} \to R. T(A) = a+b+c+d$ , $where\ A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ *(3 degrees).*

**Q(6)** Find the kernel of the fowling linear transformations:

$(a)\ T : P_3 \ \rightarrow \ P_2 ,\qquad T(a_0 + a_1x + a_2x^2 + a_3x^3) = \ a_1 + 2a_2x + 3a_3x^2$

$(b) T : R^2 \ \rightarrow \ R^2,\qquad T(,y) = \ (x + 2y,\ y - x).$ (3 degrees).

**<u>Q7</u>** Find the eigenvalues and the corresponding eigenvectors of :

$$A = \begin{bmatrix} 1 & -4 \\ -2 & 8 \end{bmatrix}.$$ (3 degrees)

***<u>With all the best</u>***