

Pg Math 15th June...

> T((b(a)) = 1'(a) T(n) = 0 = 0.1.40. M + 0.3 T(n) = 1 = 1.1 + 0. M + 0.3 T(n) = 1 = 1.1 + 0. M + 0.3 T(n) = 1 = 1.1 + 0. M + 0.3 T(n) = 1 = 1.1 + 0. M + 0.3 T(n) = 1.1 + 0. M + 0.3 T(n) = 1.1 + 0.3Let W be the vector space of all real polynomials of degree at most 3. Define $T:W \to W$ by shown vectors, is given by $T(n) = \frac{1}{2} \int_{-\infty}^{\infty} \frac{1}{2} \int$

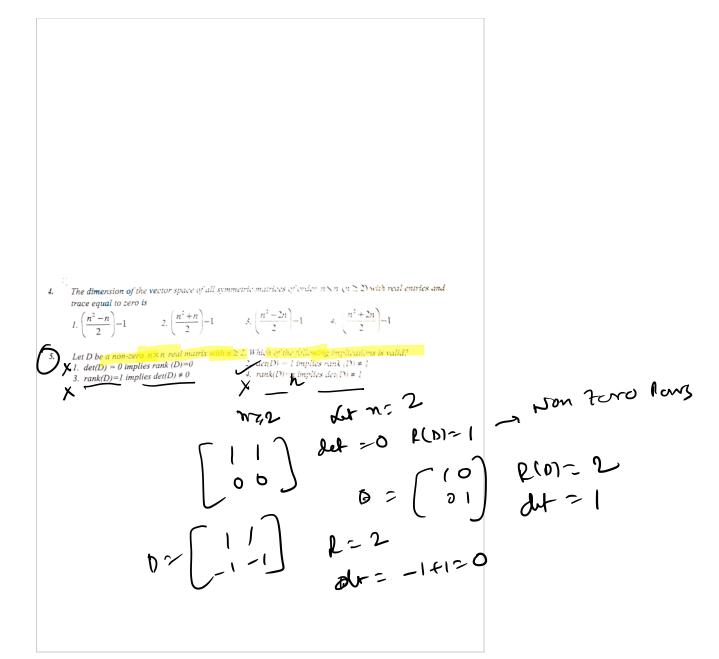
Let $S = \{A : A = [a_{ij}]_{S \times S}, a_{ij} = 0 \text{ or } 1 \forall i, j, \sum_i a_{ij} = 1 \forall i \text{ and } \sum_i a_{ij} = 1 \forall j\}$. Then the number of elements in S is

4. 55

1. 5²

5-2 0 0 0 0 0 ξ-1 0 0 0 Let ξ be a primitive fifth root of unity. Define A = 00 0 5 0 $0 0 0 \xi^{2}$

For a vector $v = (v_1, v_2, v_3, v_4, v_5) \in \mathbb{R}^5$, define $|v|_A = \sqrt{|vAv|^T}$, where v^T is transpose of v. If w = (1,-1,1,1,-1), then $|w|_A$ equals 1. 0 3. -1 4. 2



Negrow A, B are $n \times n$ positive definite matrices and 1 be the $n \times n$ identity matrix. Then which of t_{l_0} following are positive definite. 2, ABA NR hon ben my ho mond with when P with the mond with P with the mond with P w Let $a_{ij} = a_i a_j$, $1 \le i, j \le n$, where $a_p ..., a_n$ are real numbers. Let $A = ((a_{ij}))$ be the $n \times n$ matrix $\{(a_{ij})\}$. 1. it is possible to choose $a_1,...,a_n$ so as to make the matrix A non-singular. 2. the matrix A is positive definite if $(a_1,...,a_n)$ is a non-zero vector. 3. the matrix A is positive semidefinite for all $(a_1,...,a_n)$. 4. for all $(a_1,...,a_n)$, zero is an eigenvalue of A.

9.	Let T be a linear transformation on the real vector space \mathbb{R}' over \mathbb{R} such that $T = \lambda T$ for something
	Then

- 1. $||Tx|| = \lambda ||x|| \text{ for } x \in \mathbb{R}^*.$
- 2. If ||Tx|| = ||x|| for some non-zero vector $x \in \mathbb{R}^s$, then $\lambda = \pm 1$
- 3. $T = \lambda I$, where I is the identity transformation on \mathbb{R}^* .
- 4. If ||Tx|| > ||x|| for a non-zero vector $x \in \mathbb{R}^*$, then T is necessarily singular.

10. Let M be the vector space of all
$$3 \times 3$$
 real matrices and let $A = \begin{pmatrix} 2 & 1 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$. Which of the following

are subspaces of M?

 $I.\ \{X\in M: XA=AX\}$

2. $\{X \in M : X + A = A + X\}$

3. $\{X \in M : trace(AX) = 0\}$

4. $\{X \in M : \det(AX) = 0\}$

11. Let
$$W = \{p(B): p \text{ is a polynomial with real coefficients}\}$$
, where $B = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$. The dimension d

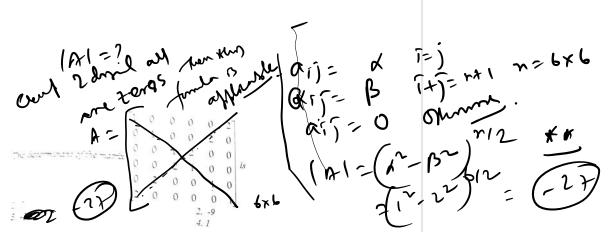
of the vector space W satisfies

 $1. \ 4 \le d \le 6$

2. $6 \le d \le 9$

3. $3 \le d \le 8$

4. $3 \le d \le 4$



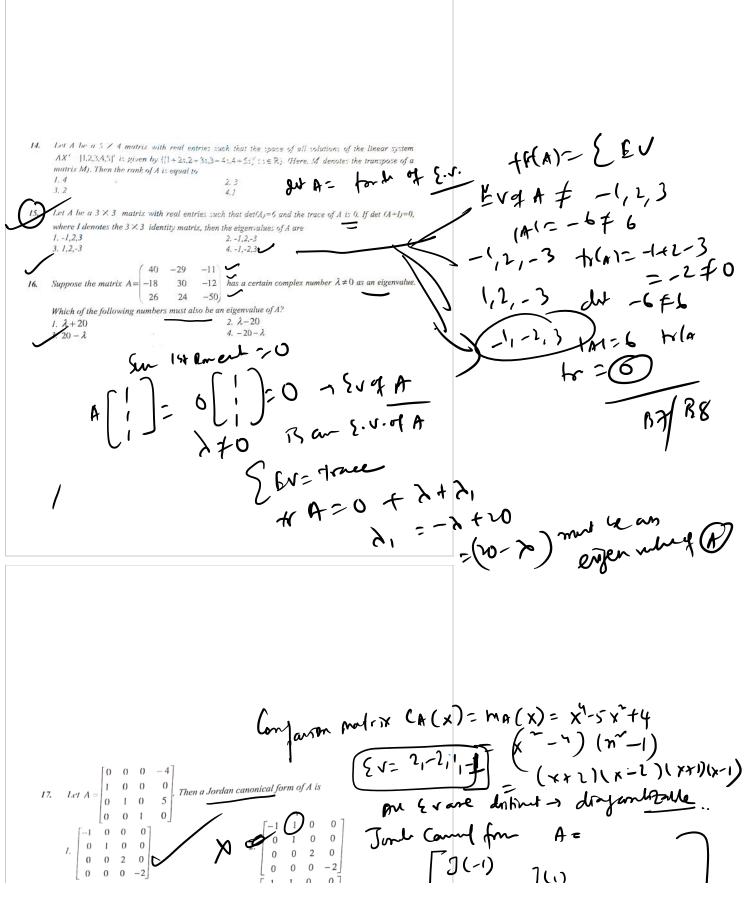
For a positive integer n, let P_n denote the space of all polynomials p(x) with coefficients in \mathbb{R} such that $\deg p(x) \leq n$, and let B_n denote the standard basis of P_n given by $B_n = \{1, x, x^2, ..., x^n\}$. If $T: P_3 \to P_4$ is the linear transformation defined by $T(p(x)) = x^2 p'(x) + \int_0^x p(t)dt$ and $A = \{a_{ij}\}$ is the 5×4 matrix of T with respect to standard bases B_3 and B_{ij} then

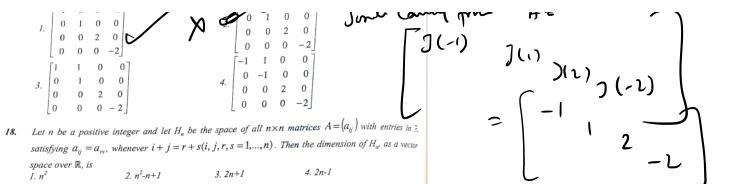
1.
$$a_{12} = \frac{3}{2}$$
 and $a_{13} = \frac{7}{3}$

2.
$$a_{32} = \frac{3}{2}$$
 and $a_{33} = 0$

3.
$$a_{32} = 0$$
 and $a_{33} = \frac{7}{3}$

4.
$$a_{32} = 0$$
 and $a_{33} = 0$





- 19. Consider a matrix $A = (a_{ij})_{son}$ with integer entries such that $a_{ij} = 0$ for i > j and $a_{ii} = 1$ for i = 1, ..., R. Which of the following properties must be true?
 - 1. A exists and it has integer entries

 - A⁻¹ exists and it has some entries that are not integers
 A⁻¹ is a polynomial function of A with integer coefficients
 - 4. A-1 is not a power of A unless A is the identity matrix
- 20. Let J be the 3×3 matrix all of whose entries are I. Then
 - 1. 0 and 3 are the only eigenvalues of A
 - 2. J is positive semidefinite, i.e., $\langle Jx, x \rangle \ge 0$ for all $x \in \mathbb{R}^3$
 - 3. J is diagonalizable
 - 4. J is positive definite, i.e., $\langle Jx, x \rangle > 0$ for all $x \in \mathbb{R}^J$ with $x \neq 0$.
- Let A, B be complex n×n matrices. Which of the following statements are true?
 If A, B and A+B are invertible, then A^T+B^T is invertible.
 If A, B and A+B are invertible, then A^T-B^T is invertible.

 - If AB is nilpotent, then BA is nilpotent.
 Characteristic polynomials of AB and BA are equal if A is invertible.

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- 25. Let A be a 2×2 non-zero matrix with entries in \mathbb{C} such that $A^2 = 0$. Which of the following statements must be true?

 - 1. PAP^{J} is diagonal for some invertible 2×2 matrix P with entries in \mathbb{R} . X2. A has two distinct eigenvalues in \mathbb{C} 3. A has only one eigenvalue in \mathbb{C} with multiplicity 24. Av=v for some $v \in \mathbb{C}^{J}$, $v \neq 0$
- 26. Consider the linear transformation $T: \mathbb{R}' \to \mathbb{R}'$ defined by $T(x_1, x_2, ..., x_6, x_7) = (x_7, x_6, ..., x_2, x_1)$. Which of the following statements are true?
 - 1. The determinant of T is 1
 - 2. There is a basis of R' with respect to which T is a diagonal matrix
 - 3. $T^7 = I$
 - 4. The smallest n such that T"=I, is even
- 27. Let λ, μ be distinct eigenvalues of a 2×2 matrix A. Then, which of the following statements must be
 - 1. A² has distinct eigenvalues
 - 2. $A^{3} = \frac{\lambda^{3} \mu^{3}}{\lambda \mu} A \lambda \mu (\lambda + \mu) I$
 - 3. trace of A^n is $\lambda^n + \mu^n$ for every positive integer n
 - 4. An is not a scalar multiple of identity for any positive integer n

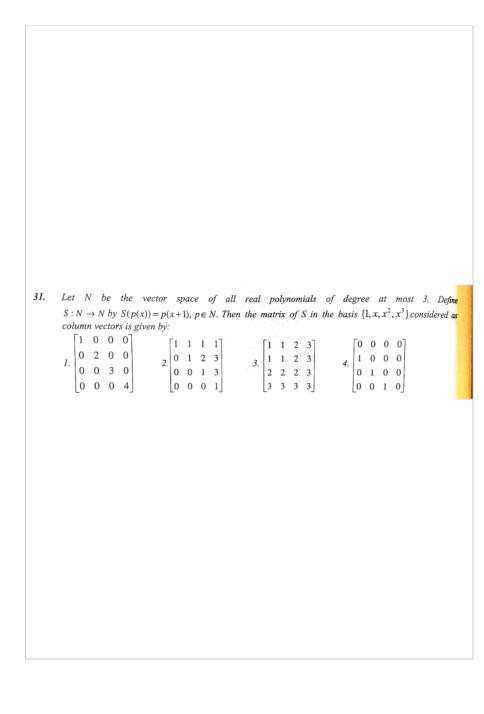
$$A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \qquad B = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

8. Let A, B be $n \times n$ real matrices. Which of the following statements is correct?

1. rank(A+B) = rank(A) + rank(B)2. $rank(A+B) \le rank(A) + rank(B)$ 3. $rank(A+B) = min\{rank(A), rank(B)\}$ 4. $rank(A+B) = max\{rank(A), rank(B)\}$

- $|\mathbf{v}|_A = \sqrt{|\mathbf{v}A\mathbf{v}^T|}$, where \mathbf{v}^T is transpose of \mathbf{v} . If $\mathbf{w} = (1,1,1)$ then $|\mathbf{w}|_A$ equals 1.0
- The dimension of the vector space of all symmetric matrices $A = (a_{ij})$ of order $n \times n (n \ge 2)$ with real entries, a11=0 and trace zero is 1. $(n^2+n-4)/2$ 2. $(n^2-n+4)/2$ 3. $(n^2+n-3)/2$ 4. $(n^2-n+3)/2$

29. Let ξ be a primitive cube root of unity. Define $A = \begin{bmatrix} \xi^{-1} & 0 \\ 0 & \xi \end{bmatrix}$. For a vector $\mathbf{v} = (v_1, v_2, v_3) \in \mathbb{R}^2$ define $\mathbf{v} = \begin{bmatrix} \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\ \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} & \mathbf{v} \\$



Which of the following matrices are positive definite?

1. $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ 2. $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ 3. $\begin{bmatrix} 4 & -1 \\ -1 & 4 \end{bmatrix}$ 4. $\begin{bmatrix} 0 & 4 \\ 4 & 0 \end{bmatrix}$

$$1. \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

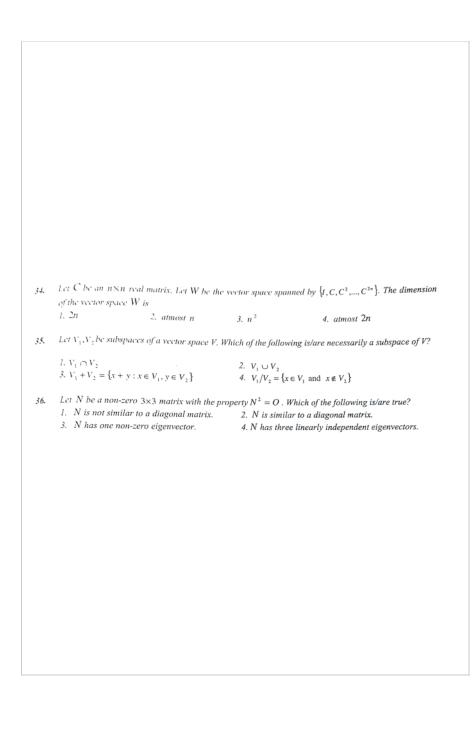
$$2.\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 4 & -1 \\ -1 & 4 \end{bmatrix}$$

$$4.\begin{bmatrix}0&4\\4&0\end{bmatrix}$$

33. Let A be a non-zero linear transformation on a real vector space V of dimension n. Let the subspace $V_{\phi} \subset V$ be the image of V under A. Let $k = \dim V_0 < n$ and suppose that for some $\lambda \in \mathbb{R}$, $A^2 = \lambda A$. Then $l. \lambda = 1$

- 2. $\det A = |\lambda|^n$
- 3. À is the only eigenvalue of A
- 4. there is a nontrivial subspace $V_1 \subset V$ such that Ax = 0 for all $x \in V_1$



37.	Let n be a positive integer and let $M_n(\mathbb{R})$ denote the space of all n×n real matrices. If $T: M_n(\mathbb{R}) \to M_n(\mathbb{R})$ is a linear transformation such that $T(A)=0$ whenever $A \in M_n(\mathbb{R})$ is symmetric or skew-symmetric, then the rank of T is					
	1. $\frac{n(n+1)}{2}$ 2. $\frac{n(n-1)}{2}$	3. n	4. 0			

- 38. Let $S: \mathbb{R}^{l} \to \mathbb{R}^{s}$ and $T: \mathbb{R}^{s} \to \mathbb{R}^{s}$ be linear transformations such that $T \circ S$ is the identity map of \mathbb{R}^{s} . Then 1. $S \circ T$ is the identity map of \mathbb{R}^{s} 2. $S \circ T$ is one—one, but not onto. 3. $S \circ T$ is onto, but not one-one. 4. $S \circ T$ is neither one—one nor onto.
- 39. Let V be a 3-dimensional vector space over the field $F_3 = \mathbb{Z}/3\mathbb{Z}$ of 3 elements. The number of distinct 1-dimensional subspaces of V is
 1. 13
 2. 26
 3. 9
 4. 15
- 40. Let V be the inner product space consisting of linear polynomials, $p: [0,1] \to \mathbb{R}$ (i.e., V consists of polynomials p of the form p(x) = ax + b; $a, b \in \mathbb{R}$), with the inner product defined by $\langle p,q \rangle = \int_{0}^{1} p(x) q(x) dx$ for $p,q \in V$. An orthonormal basis of V is

1.
$$\{1, x\}$$
 2. $\{1, x\sqrt{3}\}$ 3. $\{1, (2x-1)\sqrt{3}\}$ 4. $\{1, x-\frac{1}{2}\}$

[0 0 0 1] $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$. Then the rank of the 4 \times 4 41. Let f(x) be the minimal polynomial of the 4×4 matrix A =0 0 1 0

matrix f(A) is 1. 0

2. I

3. 2

4. 4

- 42. Let a, b, c be positive real numbers such that $b^2 + c^2 < a < 1$. Consider the 3×3 matrix $A = \begin{bmatrix} b & a & 0 \end{bmatrix}$

 - 1. All the eigenvalues of A are negative real numbers.
 2. All the eigenvalues of A are positive real numbers.
 3. A can have a positive as well as a negative eigenvalue.
 4. Eigenvalues of A can be non-real complex numbers.
- 43. The system of equations x+y+z=1, 2x+3y-z=5, x+2y-kz=4, where $k\in\mathbb{R}$, has an infinite number of solutions for 1. k=0 2. k=1 3. k=2 4. k=3

44. Let n be an integer, $n \ge 3$ and let $u_1, u_2, ..., u_n$ be n linearly independent elements in a vector space over R. Set $u_0 = 0$ and $u_{n+j} = u_j$. Define $v_i = u_i + u_{i+j}$ and $w_i = u_{i,j} + u_j$ for i = 1, 2, ..., n. Then 1. $v_j, v_j, ..., v_n$ are linearly independent, if n = 2010.

2. v_p, v_p, \dots, v_n are linearly independent, if n = 2011. 3. w_p, w_p, \dots, w_n are linearly independent, if n = 2010.

4. $w_1, w_2, ..., w_n$ are linearly independent, if n = 2011.

45. Let V and W be finite-dimensional vector spaces over \mathbb{R} and let $T_i : V \to V$ and $T_2 : W \to W$ be linear transformations whose minimal polynomials are given by $f_1(x) = x^3 + x^2 + x + 1$ and $f_2(x) = x^4 - x^2 - 2$. Let $T: V \oplus W \to V \oplus W$ be the linear transformation defined by $T((v, w)) = (T_1(v), T_2(w))$ for $(v, w) \in V \oplus W$ and let f(x) be the minimal polynomial of T. Then 4. nullity(T) = 03. nullity(T) = I $2. \deg f(x) = 5$ $I. \ deg f(x) = 7$

46. Let $a, b, c, d \in \mathbb{R}$ and let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be the linear transformation defined by $T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} ax + by \\ cx + dy \end{bmatrix}$

for $\begin{bmatrix} x \\ y \end{bmatrix} \in \mathbb{R}^2$. Let $S: \mathbb{C} \to \mathbb{C}$ be the corresponding map defined by S(x+iy) = (ax+by) + i(cx+dy)

for $x, y \in \mathbb{R}$. Then

- 1. S is always C. linear, that is $S(z_1 + z_2) = S(z_2) + S(z_2)$ for all $z_1 z_2 \in \mathbb{C}$ and $S(\alpha z_1) = \alpha S(z_2)$ for all u.e Candze C. 2. S is \mathbb{C} - linear if b = -c and d = a.
- 3. Six C linear only if b = -c and d = a.
- 4. S is C linear if and only if T is the identity transformation.
- 47. Let $\Lambda = [a_{ij}]$ be an $n \times n$ complex matrix and let Λ denote the conjugate transpose of Λ . Which of the following statements are necessarily true?
 - 1. If A is invertible, then $tr(A^*A) \neq 0$, i.e., the trace of A A is non zero.
 - 2. If $tr(\Lambda^* A) \neq 0$, then A is invertible.
 - 3. If $|\operatorname{tr}(A^{\lambda}A)| < n^2$, then $|a_{ij}| < 1$ for some i.j. 4. If $\operatorname{tr}(A^{\lambda}A) = 0$, then A is the zero matrix.

 trace of T is non-zero. nullity of T is 1 T° = T ∘ T ∘ ∘ T (n times) is the zero map. Let A and B be n × n real matrices such that AB = BA = O and A ÷ B is invertible. Which following are always true? rank (A) = rank (B) rank (A) ÷ rank (B) = n. A - B is invertible. Let n be an integer ≥ 2 and let M_n (R) denote the vector space of n × n real matrices. Let B ∈ M_n 					
Then 1. trace of T is non-zero. 2. $rank$ of T is n . 3. $nullity$ of T is 1 4. $T^n = T \circ T \circ \circ T$ (n times) is the zero map. 49. Let A and B be $n \times n$ real matrices such that $AB = BA = O$ and $A + B$ is invertible. Which following are always true? 1. $rank$ (A) = $rank$ (B) 2. $rank$ (A) + $rank$ (B) = n . 3. $nullity$ (A) + $nullity$ (B) = n . 4. $A - B$ is invertible. 50. Let n be an integer ≥ 2 and let M_n (\mathbb{R}) denote the vector space of $n \times n$ real matrices. Let $B \in M_n$ an orthogonal matrix and let B denote the transpose of B . Consider $W_a = \{B' AB : A \in M_n \setminus \mathbb{R}\}$. We the following are necessarily true? 1. W_B is the subspace of M_n (\mathbb{R}) and dim $W_B \leq rank$ (B). 2. W_B is the subspace of M_n (\mathbb{R}) and dim $W_B = rank$ (B). 3. $W_B = M_n$ (\mathbb{R}).					
Then 1. trace of T is non-zero. 2. rank of T is n . 3. nullity of T is T 4. $T^n = T \circ T \circ \circ T$ (T times) is the zero map. 9. Let T and T is the zero map. 19. Let T and T is invertible. Which following are always true? 1. T is T and T is T and T is invertible. Which following are always true? 1. T is T and T is T and T and T is invertible. 50. Let T be an integer T and let T is invertible. 51. Let T be an integer T and let T is invertible. 52. Let T be an integer T and let T is invertible. 53. Let T be an integer T and let T is denote the transpose of T is T and T is invertible. 14. A T is invertible. 15. Let T be an integer T and let T is denote the vector space of T is T in an arrives. Let T is T is the following are necessarily true? 1. T is the subspace of T is T and T is T in an T is invertible. 15. T is invertible. 16. Let T be an integer T and let T is invertible. 17. Let T be an integer T and let T is invertible. 18. Let T be an integer T and let T is invertible. 19. Let T be an integer T and let T is invertible. 19. Let T be an integer T and T is invertible. 10. Let T be an integer T and T is invertible. 10. Let T be an integer T and T is invertible. 10. Let T be an integer T and T is invertible. 10. Let T be an integer T and T is invertible. 10. Let T be an integer T and T is invertible. 10. Let T be an integer T and T is invertible. 11. T be an integer T and T is invertible. 12. T and T is invertible. 13. T and T is invertible. 14. T is T and T in T in T in T and T is invertible. 15. T and T is invertible. 16. Let T be an integer T and T is invertible. 17. T and T is invertible. 18. T and T is T and T					
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 3. nullity of T is 1 4. Tⁿ = T ∘ T ∘ ∘ T (n times) is the zero map. 49. Let A and B be n × n real matrices such that AB = BA = O and A ÷ B is invertible. Which following are always true? 1. rank (A) = rank (B) 2. rank (A) + rank (B) = n. 3. nullity (A) + nullity (B) = n. 4. A - B is invertible. 50. Let n be an integer ≥ 2 and let M_n (R) denote the vector space of n × n real matrices. Let B ∈ M_n an orthogonal matrix and let B' denote the transpose of B. Consider W₃ = {B' AB : A∈M_n (R)}. We the following are necessarily true? 1. W_B is the subspace of M_n (R) and dim W₃ ≤ rank (B). 2. W_B is the subspace of M_n (R) and dim W₃ = rank (B) rank (B'). 3. W_B = M_n (R). 	is the linear transformation satisfying $T(e) = e$ for $i = 1, 2, n$ and $T(e) = 0$				
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an orthogonal matrix and let B' denote the transpose of B . Consider $W_3 = \{B' AB : A \in M_n(\mathbb{R})\}$. We the following are necessarily true? 1. W_B is the subspace of $M_n(\mathbb{R})$ and dim $W_3 \le rank(B)$. 2. W_B is the subspace of $M_n(\mathbb{R})$ and dim $W_3 = rank(B) rank(B')$. 3. $W_B = M_n(\mathbb{R})$.					
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3. $W_B = M_n(\mathbb{R})$.	1. W_B is the subspace of $M_R(\mathbb{R})$ and dim $W_B \leq rank(B)$.				
	 W_B is the subspace of M_R (ℝ) and dim W_B = rank (B) rank (B'). 				
4. W _B is not a subspace of M _B (Na).					