



Rajiv Gandhi University of Knowledge Technologies

Weekly Test 2 – Matrix Algebra

Date: 25-08-2012

Time: 30 Min

Course: E2Sem1_ECE/ E2Sem1_ABC/E3Sem1_ABC

Max Marks: 10

Answer Any TEN of the Following

$10 \times 1 = 10M$

1. If $\mathbf{u} = (2, 4, 3)$ and $\mathbf{v} = (2, 1, -1)$ in \mathbb{R}^3 with the standard inner product, then $d(\mathbf{u}, \mathbf{v}) =$

- A. 5
- B. 25
- C. 45
- D. 0

2. If inner product on the vector space P_n of polynomials is defined as $\langle f, g \rangle = \int_0^1 f(t)g(t)dt \quad \forall f, g \in P_n$, then $\langle f, g \rangle =$ ____ for $f(x) = x^2 + x - 4$, $g(x) = x - 1$.

- A. $\frac{1}{3}$
- B. $\frac{4}{3}$
- C. $\frac{27}{4}$
- D. $\frac{7}{4}$

3. If inner product in \mathbb{R}^2 is defined as $\langle \mathbf{u}, \mathbf{v} \rangle = u_1 v_1 - u_2 v_1 + 4u_1 v_2$ where $\mathbf{u} = (u_1, u_2), \mathbf{v} = (v_1, v_2) \in \mathbb{R}^2$, then norm of $\langle 2, 3 \rangle$ is

- A. 22
- B. $\sqrt{22}$
- C. $\sqrt{13}$
- D. 13

4. The determinant of an orthogonal matrix is

- A. 0
- B. 1
- C. -1
- D. ± 1

5. If \mathbf{A} and \mathbf{B} are orthogonal matrices of same order, then which of the following is not true?

- A. \mathbf{AB} is orthogonal
- B. \mathbf{A}^n and \mathbf{B}^n are orthogonal for all $n \in \mathbb{N}$
- C. \mathbf{A}^{-1} and \mathbf{B}^{-1} are orthogonal
- D. None of the above

6. Angle between the vectors $(2, -1, 2)$ and $(1, 1, 4)$ is

- A. 0
- B. $\frac{\pi}{3}$
- C. $\frac{\pi}{4}$
- D. $\frac{\pi}{6}$

7. A square matrix is unitary if

- A. Columns are orthonormal
- B. Rows are orthonormal
- C. Both columns and rows are orthonormal
- D. All the above

8. Let \mathbf{A} be an $n \times n$ matrix which is both Hermitian and Unitary. Then \mathbf{A} is

- A. Involutory matrix
- B. Nilpotent matrix
- C. Idempotent matrix
- D. Real matrix

9. Which of the following statement is not true?

- A. \mathbf{A} is orthogonal if $\mathbf{A}^T = \mathbf{A}^{-1}$
- B. If \mathbf{A} is unitary then determinant of \mathbf{A} is ± 1
- C. If \mathbf{A} and \mathbf{B} are unitary, then \mathbf{AB} is unitary
- D. None of the above

10. Which of the following matrices is normal?

- A. Orthogonal
- B. Unitary
- C. Skew-Hermitian
- D. All the above

11. If \mathbf{A} is both triangular and normal matrix, then \mathbf{A} is

- A. Identity matrix
- B. Diagonal matrix
- C. Scalar matrix
- D. Involutory matrix

12. The matrix $A = \begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is

- A. Hermitian
- B. Orthogonal
- C. Normal
- D. Both Hermitian and Normal

KEY TO WEEKLY TEST-2

- 1. A
- 2. D
- 3. B
- 4. D
- 5. D
- 6. C
- 7. D
- 8. A
- 9. B
- 10. D
- 11. B
- 12. D