考试教室　姓名　学号　年级　专业、班　学院

公平竞争、诚实守信、严肃考纪、拒绝作弊

装　订　线

重庆大学《线性代数》课程试卷

⊙ A 卷
○ B 卷

2019—2020 学年第 **1** 学期

开课学院: 数统学院　课程编号: MATH30084　考试日期: 2019.12.24

考试方式: 开卷、闭卷、其它　考试时间: 120 分钟

题号	1	2	3	4	5	6	总分
得分							

考试提示

1. 严禁随身携带通讯工具等电子设备参加考试;

2. 考试作弊, 留校察看, 毕业当年不授学位; 请人代考、替他人考试、两次以上作弊等, 属严重作弊, 开除学籍.

1. Find the least squares solutions of the following equation system. Determine whether or not the least square solutions are the solutions of the system. Justify your answer (15 points).

$$
\begin{aligned}
x_1 - x_2 + 3x_3 + 2x_4 &= 1\\
-x_1 + x_2 - 2x_3 + x_4 &= -2\\
2x_1 - 2x_2 + 5x_3 + x_4 &= 1
\end{aligned}
$$

命题（组题）人：黄辉斥

审题人：赵显锋

命题时间：19年12月9日

教务处制

2. For $A = \begin{bmatrix} 2 & 5 & 7 \\ 0 & 1 & -2 \\ 0 & -3 & 6 \end{bmatrix}$, find eigenvalues and the corresponding eigenspaces of A, and compute e^A (20 points).

3. For $A = \begin{bmatrix} 1 & 1 & 2 & 6 & -2 \\ 1 & 0 & -1 & 3 & 4 \\ 2 & -1 & 0 & 3 & -2 \\ 0 & -2 & -1 & 5 & 7 \end{bmatrix}$, find an orthonormal basis of the column space of A. Here the inner product on $\mathbb{R}^n$ is given by the scalar product $x^T y$ for all x, y in $\mathbb{R}^n$ (15 points).

4. Compute det $\begin{bmatrix} -1 & 0 & 1 & 4 \\ 0 & 2 & -1 & 3 \\ 1 & 5 & 0 & -2 \\ -1 & 1 & 1 & 0 \end{bmatrix}$ and find its inverse (15 points).

5. Find the matrix representation of the linear transformation $T : P_4 \to P_4$ given by $T(p) = p' + p$ under the ordered bases $[1 - x, 2x + 5, x^2 + 1, x^3 - x^2 - x]$ and $[1, x, x^2, x^3]$ of P_4 and P_3 respectively. Here p' stands for the derivatives of p (10 points).

6. Determine whether or not the following is true. If true, prove it. If not true, give a counter-example (25 points).

(1)If one adds a linear equation into a consistent linear equation system, then the new equation system is inconsistent.

(2)Each eigenvalue of a Hermitian matrix H is a real number;

(3)The transpose of a unitary matrix is Hermitian;

(4)The product of two invertible matrices is still invertible;

(5)The union of two subspaces of a vector space is a vector space.