

重庆大学《线性代数》课程试卷

☒ A 卷
☐ B 卷

2018—2019 学年第 2 学期

开课学院: 数统学院 课程编号: MATH30084 考试日期: 2019.4.23
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. Determine whether or not the following equation systems have solutions. If it has solutions, solve it. Otherwise find its least squares solutions (20 points).

(1).

$$x_1 - x_2 + 3x_3 + 2x_4 = 1$$

$$-x_1 + x_2 - 2x_3 + x_4 = -2$$

$$2x_1 - 2x_2 + 7x_3 + 7x_4 = 1$$

命题 (组题) 人: 黄辉斥

审题人: 赵显锋

命题时间: 19 年 4 月 9 日

教务处制

(2).

$$x_1 - 2x_2 + 3x_3 = 1$$

$$-2x_1 + x_2 - 2x_3 = -2$$

$$-2x_1 - 2x_2 + 2x_3 = 5$$

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

3. For $A = \begin{bmatrix} 1 & 1 & 2 & 6 & -2 \\ 1 & 1 & -1 & 3 & 4 \\ 2 & -1 & 1 & 3 & -2 \end{bmatrix}$, 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 $\det \begin{bmatrix} 1 & 0 & -1 & 4 \\ 1 & 1 & -1 & 0 \\ -1 & 2 & 0 & 3 \\ 0 & 5 & 1 & -2 \end{bmatrix}$ and find its inverse (10 points).

5. Find the matrix representation of the linear transformation $T : P_4 \rightarrow P_3$ given by $T(p) = p'' - 2p'$ under the ordered bases $[1 - x, 2x + 5, x^2 + 1, x^3 - x^2 - x]$ and $[1, x, x^2]$ of P_4 and P_3 respectively. Here p'' and p' stand for the 2nd order and the 1st order 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) Every homogeneous linear equation system has infinitely many solutions;
- (2) The conjugate of an eigenvalue of a unitary matrix U is also an eigenvalue of U ;
- (3) The transpose of a Hermitian matrix is also Hermitian;
- (4) Each entry of a positive definite matrix is a positive number;
- (5) The union of two subspaces of a vector space is a vector space.

