

Review for Exam2 (November 4, Wednesday, 3:00-5:00, Room 230, FLO.)
(closed book. Coverage: Chapters 8, 9, 10, 12, and 13, only lectured materials will be covered. No SAS programming questions.)

A. Memorize the following definitions.

- A.1 Right inverse and left inverse
- A.2 Orthogonal matrix
- A.3 Generalized inverse: simple definition and Moore-Penrose g-inverse
- A.4 Idempotent matrix
- A.5 Project and projection matrix
- A.6 Determinant of a square matrix
- A.7 Cofactor and adjoint of a matrix

B. Items B.1 - B.5 were theorems to be Memorized in the previous exam. They are still useful in this exam. In addition, Items B.6 - B.10 also need to be memorized.

- B.1 The column rank of any matrix is the same as its row rank. (Theorem 4.4.1)
- B.2 Corollary 4.4.5 (Multiplication cannot increase rank.) and Theorem 4.4.9 ($\mathbf{A} = \mathbf{B}(\sim \mathbf{I}_{r \times r})\mathbf{K}$)
- B.3 $\text{tr}(\mathbf{AB}) = \text{tr}(\mathbf{BA})$ (Lemma 5.2.1)
- B.4 Lemma 5.3.1 ($\text{Tr}(\mathbf{A}'\mathbf{A}) = 0$ iff $\mathbf{A} = \mathbf{0}$.)
- B.5 A square matrix is invertible if and only if it is full rank.
- B.6 The idea of the inverse of a partitioned matrix (Not the detailed formula)
- B.7 Theorem 9.4.1 The condition for the invariance of the g-inverse choices.
- B.8 The formation of the projection matrix for given $S_p(\mathbf{x}_1, \mathbf{x}_2, \dots, \mathbf{x}_n)$.
- B.9 The effects of elementary row operations on a determinant.
- B.10 The matrix inverse expressed by determinants.

C. Things to review

- C.1 Exercises 5-7.