

LINEAR MODELS AND DECISIONS
FINAL EXAM

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DEFINE AND EXPLAIN: (10 POINTS EACH)

- 1) STATISTICAL GAME
- 2) STATISTICAL DECISION RULE
- 3) A MINIMUM MEAN SQUARE ERROR ESTIMATOR
- 4) THE POWER OF A TEST
- 5) A MAXIMUM LIKELIHOOD ESTIMATOR
- 6) A LIKELIHOOD RATIO TEST
- 7) THE GENERAL LINEAR MODEL
- 8) THE LEAST SQUARES ESTIMATION CRITERION
- 9) A RANDOMIZED BLOCK DESIGN
- 10) A COVARIANCE DESIGN
- 11) A FACTORIAL DESIGN
- 12) AN ORTHOGONAL DESIGN
- 13) A BALANCED INCOMPLETE BLOCK DESIGN
- 14) A FRACTIONAL FACTORIAL DESIGN
- 15) AN INTERACTION
- 16) A DUMMY VARIABLE
- 17) A RANDOM EFFECTS MODEL
- 18) A NESTED DESIGN
- 19) A GENERALIZED LEAST SQUARES ESTIMATOR
- 20) A TWO STAGE LEAST SQUARES ESTIMATOR

(20 POINTS EACH)

- 21) SHOW THAT THE t STATISTIC FOR TESTING $H_0: \mu_i = b_0$ IS A SPECIAL CASE OF THE F STATISTIC FOR TESTING $H_0: L = L_0$ WHERE $L = A'\beta$ FOR SOME VECTOR A .
- 22) FOR $Y = X\beta + \epsilon$ WITH X $M \times N$, EXPLAIN HOW $H_0: \beta_{k+1} = \beta_{k+2} = \dots = \beta_N = 0$ CAN BE TESTED, GIVE RATIONALE.
- 23) A) WHAT ARE THE TWO PRIMARY ASSUMPTIONS OF THE OLS PROCEDURE? B) WHERE ARE THEY ASSUMED?
C) UNDER WHAT CONDITIONS ARE THEY LIKELY TO BE VIOLATED? D) WHAT CAN BE DONE IF THE ASSUMPTIONS ARE NOT MADE?
- 24) DERIVE $\hat{\beta}$ FOR $Y = X\beta + \epsilon$ FROM THE ORDINARY LEAST SQUARES CRITERION.
- 25) PRESENT A DISCUSSION OF METHODOLOGICAL CONSIDERATIONS INVOLVED IN THE DESIGN OF A STUDY