Econ 120C **Ramu Ramanathan**
Spring 1998 **First Midterm (20%)**

Your name (please print it) _____

Your Student Id. (NOT Soc. Sec. no.)_____

DO NOT TURN THE PAGE UNTIL EVERYONE HAS RECEIVED THE EXAM AND YOU ARE GIVEN THE SIGNAL TO START. ALSO, YOU MUST STOP WRITING WHEN YOU ARE ASKED TO DO SO (YOU WILL BE GIVEN A 2 MINUTE WARNING). TEN POINTS WILL BE DEDUCTED FOR EACH MINUTE OF EXTRA TIME IT TAKES YOU TO STOP WRITING.

If you use a pencil, you forfeit the right to complain about grading UNLESS YOU PICK UP THE EXAM FROM THE TA FROM HIS/HER OFFICE AND LOOK AT THE GRADING BEFORE LEAVING THE OFFICE.

Make sure that all pages (1 through 5) are there. Read the questions carefully and make sure that you do not misunderstand them. If you get stuck somewhere, don't waste time but move on.

IN THE HYPOTHESIS TESTING PARTS, DON'T ASK ME WHETHER THE TEST IS ONE-SIDED OR TWO-SIDED. YOU HAVE TO FIGURE THAT OUT FOR YOURSELF FROM THE INFORMATION PROVIDED.

I CONSIDER CHEATING AS A VERY SERIOUS MATTER AND WILL GIVE AN F IN THE COURSE TO ANY ONE CHEATING AND ALSO REFER HIM/HER TO THE DEAN FOR DISCIPLINARY ACTION.

MAXIMUM NUMBER OF POINTS = 70

I. Consider the double log model (t-subscript is omitted for simplicity)

$$\text{lhouse} = \beta_1 + \beta_2\,\text{lpcgnp+} + \beta_3\,\text{lunemp} + \beta_4\,\text{lintrat} + u$$

where lhouse is the natural log of new housing starts in the U.S., lpcgnp is the natural log of per capita GNP, lunemp is ln(unemployment rate), and lintrat is ln(mortgage rate). Housing starts and per capita GNP are in thousands and the other two variables are percentages. Using data for 23 periods, the following estimates and their standard errors were obtained.

VARIABLE	COEFFICIENT	STDERROR
constant	-1.29838	1.27347
lpcgnp	2.31275	0.700321
lunemp	0.245648	0.186777
lintrat	-1.37653	0.331935

All tests you are asked to conduct below should be at the 5 percent level. DON'T FORGET TO ANSWER ALL PARTS OF THE QUESTIONS. Otherwise you might lose points unnecessarily.

I.1 (10 points)
Test whether the elasticity with respect to per capita GNP (β_2) is equal to 1 or not. Show all your steps and be sure to calculate the test statistics, state its distribution including d.f., and the decision rule. What is your conclusion in words? Is housing elastic or inelastic or unity elastic with respect to GNP?

I.2 (10 points)
Test whether the elasticity with respect to unemployment is equal to 0 or not. Show all your steps and be sure to calculate the test statistics, state its distribution including d.f., and the decision rule. What is your conclusion in words? Is housing elasticity with respect to unemp significant or not?

I.3 (10 points)
Test whether the elasticity with respect to interest rate is equal to −1 or not. Show all your steps and be sure to calculate the test statistics, state its distribution including d.f., and the decision rule. What is your conclusion in words? Is housing elastic or inelastic or unity elastic with respect to interest rate?

I.4 (5 points)
Suppose housing start data are converted to actual numbers instead of thousands and the new variable (called house*) is used instead of house in a double log form. How will this unit change affect the estimates in the above table? Indicate which coefficients will change and which ones will not. For the ones that change write the new value (if your calculate cannot take logs, just leave it as an expression).

II. Consider the household consumption function (Model A)

$$C = \alpha + \beta Y + u$$

where C and Y are household consumption expenditures and disposable income respectively. I believe that α is not a constant but is a simple function of the family size N and that β is a function of both N and Y.

II.1 (6 points)
Derive another econometric model (Model B) that incorporates all the above beliefs. Do this carefully and correctly as otherwise you will not get full credit for the remaining parts of this question.

II.2 (5 points)
State the null hypothesis on the parameters of Model B which, if true, will make Model A the restricted model.

II.3 (9 points)
Step by step describe the procedure for using the Lagrange Multiplier (LM) test for testing the hypothesis you stated in II.2. If you like, you can answer this part by giving the ESL commands. Give complete details that demonstrate that you really understand the procedure. Wherever numerical values can be provided you must state them and not use general symbols.

III. In the model formulated in question I, suppose the data were quarterly and I want to test whether the elasticity of housing with respect to per capita GNP is different for different quarters.

III.1 (5 points)
Formulate another econometric model that will enable you to test the above hypothesis. Be sure to define any new variables needed to perform the test.

III.2 (3 points)
State the null hypothesis for testing my belief.

III.3 (7 points)
Step by step describe the procedure for using the Wald test (not the LM test) appropriate for testing the hypothesis you stated in III.2. If you like, you can answer this part by giving the ESL commands. Give complete details that demonstrate that you really understand the procedure. Wherever numerical values can be provided you must state them and not use general symbols.