

## Exam No. 2 on Topics from Chapters 2 through 6 (1 hour)

Consider the household consumption function  $C_t = \mathbf{a} + \mathbf{b} Y_t + u_t$ , where  $C_t$  is the  $t^{\text{th}}$  household's total consumption expenditures and  $Y_t$  is its disposable income in a year, both measured in thousands of dollars. You believe that the parameters  $\mathbf{a}$  and  $\mathbf{b}$  are not fixed but  $\mathbf{a}$  depends on the family size ( $N_t$ ) and  $\mathbf{b}$  depends on the family size ( $N_t$ ) and income ( $Y_t$ ).

1. (5 points)

Formulate another econometric model that will enable you to allow for the parameters to vary as specified. What new variables are to be generated?

2. (10 points) In the new model, derive an expression for the marginal effect on consumption (that is, on  $C$ ) with respect to family size (that is,  $N$ ).

3. (5 points)

State the null and alternative hypotheses in the new model to test the hypothesis that the size of the household does not affect consumption.

4. (10 points)

To use the Lagrange Multiplier (LM) test, describe what regression(s) are to be run and how the test statistic is to be computed (for  $n = 40$ ). Make your answers specific to the above models and provide numerical answers wherever known.

5. (5 points) Describe the distribution of the test statistic and how you can apply the  $p$ -value approach with 10% level for acceptance or rejection. Provide numerical answers wherever known.