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

Consider the Cobb-Douglas production $Q_t = e^a K_t^b L_t^g e^{u_t}$. You have data on Q_t, K_t, and L_t.

1. (6 points) Derive a model (Model A) that will help you estimate the parameters $a, b,$ and g .

Technical progress continuously shifts the production function over time. In particular, you believe that $a, b,$ and g are not constant but "time-varying" with $a = a_1 + a_2 t$ and similarly for b and g .

2. (7 points) Derive another model (Model B) that incorporates this feature. What variables would you generate to estimate the two models?

The answers to the following questions must be specific to your models. No points will be given if you simply copy down formulas from the book.

3. (4+3+3+3+4 points)
You suspect that there would be multicollinearity (MC) in Model B. Explain how you can identify this. Does MC affect the properties of unbiasedness, consistency , and efficiency? In what other way does MC affect the estimates?

4. (4+4+4+4+4 points)
Describe step by step how you would use the Wald test to test the null hypothesis that there has no been shift in the production function over time. Be sure to state the null and alternative hypotheses, the regression(s) to be run, the test statistic to be computed, its statistical distribution including d.f. and the criterion for acceptance or rejection.