EC 450 Advanced Macroeconomics Instructor: Sharif F. Khan Department of Economics Wilfrid Laurier University Winter 2008

Assignment 1 (REQUIRED)

Submisson Deadline and Location: February 12 in Class

Total Marks: 50

Part A True/ False/ Uncertain Questions [20 marks]

Explain why the following statement is True, False, or Uncertain according to economic principles. Use diagrams and / or numerical examples where appropriate. Unsupported answers will receive no marks. It is the explanation that is important. Each question is worth 10 marks.

A1.

During the long periods of relatively constant growth in GDP per worker in the typical Western economy, the capital-labor ratio has stayed relatively constant.

A2.

In the basic Solow model, an increase in the level of total factor productivity raises the long-run growth rate of aggregate output per worker. [Diagrams require]

Part B Problem Solving Questions

Read each part of the question very carefully. Show all the steps of your calculations to get full marks.

B1. [30 Marks]

Consider a Solow economy with no technological progress. Assume that the production function is Cobb-Douglas:

$$Y_t = AK_t^{\lambda} N_t^{1-\lambda}, \qquad \qquad 0 < \lambda < 1,$$

where Y is aggregate output, K is the stock of aggregate capital, N is total labor and A is the total factor productivity. Assume that N grows exogenously at a constant rate n. Capital depreciates at a constant rate δ . There is no technological progress. The evolution of aggregate capital in the economy is given by

$$K_{t+1} - K_t = sY_t - \delta K_t$$

where s is a constant and exogenous saving rate.

- (a) Derive the basic law of motion, or the transition equation, for the aggregate capital per unit of labor. Plot the transition equation in a diagram. Explain how the level of aggregate capital per unit of labor will converge to the steady state value from a given positive initial value. [8 marks]
- (b) Solve for the steady state equilibrium values of aggregate capital per worker, aggregate output per worker, consumption per worker, the real rental rate for capital and the real wage rate for labor. Illustrate the steady-state equilibrium values of aggregate capital per worker, aggregate output per worker and consumption per worker in a diagram. [8 marks]
- (c) Find the growth rates of aggregate output per labor, aggregate capital per labor, aggregate output and aggregate capital on the balanced growth path. [2 marks]
- (d) Find the elasticity of the steady state equilibrium value of aggregate output per worker with respect to the saving rate. What is the economic interpretation of this elasticity if the value of $\lambda = \frac{1}{4}$. [4 marks]

(e) Find the golden rule savings rate and the golden rule level of aggregate capital per worker. Solve for the steady state equilibrium values of aggregate output per worker and consumption per worker assuming that the exogenous saving rate is equal to the golden rule savings rate. Illustrate the golden rule levels of aggregate capital per worker, aggregate output per worker and consumption per worker in a diagram. [8 marks]