SIMON FRASER UNIVERSITY
Department of Economics

Econ 305 — Prof. Kasa
Intermediate Macroeconomic Theory — Summer 2019

MIDTERM EXAM
(Solutions)

The first five questions are True, False, or Uncertain. Briefly explain your answers. No credit without explanation. (8 points each).

1. According to the Permanent Income Hypothesis, a higher savings rate predicts recessions.

   TRUE. *According to the PIH, people consume the expected average value of their income. If people expect a recession, they will save now in anticipation of the lower future income. This will enable them to maintain a constant consumption level despite their lower future income.*

2. According to the Solow model, a higher savings rate increases the economy's growth rate.

   FALSE/UNCERTAIN. *In the Solow model, a higher savings rate causes growth to increase temporarily, but not permanently. Eventually a new steady state is reached, with a higher level of per capita income, but not a higher growth rate.*

3. According to the Solow model, poor countries should grow faster than rich countries.

   UNCERTAIN. *This is true only if countries are alike in all respects except their initial capital/labor ratios. If countries are poor because they they have low savings rates or an inefficient technology, there is no reason to expect them to catch-up to rich countries. That is, the Solow model predicts conditional convergence, but not unconditional convergence.*

4. The unemployment rate can change even without any change in the number of unemployed individuals.

   TRUE. *By definition, the unemployment rate is the ratio of unemployed workers to the labor force. If the labor force changes, the unemployment rate can change, even if the number of unemployed workers remains constant.*

5. Taxing profits reduces investment.

   FALSE/UNCERTAIN. *In principle, a pure profits tax will not induce firms to change their hiring or investment decisions. (It's still optimal to maximize profits, even it they're taxed!). In practice, however, 'profits' taxes often do discourage hiring and investment, simply because accounting costs understate true economic costs, so that profits taxes operate more like revenue taxes.*

6. (20 points). Suppose an economy's production function is $Y = A \cdot K^{1/3}L^{2/3}$. Assume the following: the population (labor force) grow at rate n, capital depreciates at rate δ, productivity A is constant, and households save a fraction s of their income. Solve for the economy's steady state income per capita as a function of (A, s, n, δ).

The steady state is defined by the condition

$$sy = (n + \delta)k$$

Substituting in the given production function and solve for the steady state capital/labor ratio gives

$$k^* = \left(\frac{sA}{n+\delta}\right)^{3/2}$$

Substituting this into production fucntion then gives the steady state per capita income

$$y^* = A\left(\frac{sA}{n+\delta}\right)^{1/2}$$

7. (20 points). Suppose that at very low levels of income, households must worry about subsistence, and cannot save, i.e., their saving rate is zero. However, once the subsistence level of income is reached, households save a constant fraction, s, of their income, as was assumed in class.

   (a) Illustrate the new savings function in the usual 'Solow diagram', with the capital/labor ratio on the horizontal axis, and per capita income on the vertical axis.

   (b) Does the economy have a unique steady state? Does the long-run fate of this economy depend on where it starts?

   (c) What are the policy implications from this analysis?

   I 'borrowed' this question from Problem Set 2 in the Spring 2011 class. A detailed solution is posted near the bottom of our webpage, in the Old Problem Sets section. It's the one marked ("Due February 11"). I won't repeat the solution here.

8. (20 points). Suppose a household has preferences

$$U(C_1, C_2) = \ln(C_1) + \ln(C_2)$$

Assume that the household has an income of $Y_1 = 14$ in the first period, and $Y_2 = 12$ in the second period. Also assume the interest rate is 20%.

Calculate the household's optimal first period saving/borrowing decision.

The household's optimality condition is

$$\frac{U_{c_1}}{U_{c_2}} = 1 + r$$

This implies

$$\frac{C_2}{C_1} = 1 + r \quad \Rightarrow \quad C_1 = \frac{C_2}{1+r}$$

The household's intertemporal budget constraint is

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

Substituting in the given values for Y_1, Y_2, and r, along with the above solution for C_2 in terms of C_1 we find

$$2C_1 = 14 + \frac{12}{1.2} \quad \Rightarrow \quad C_1 = 12$$

Hence, the household chooses to save $Y_1 - C_1 = 2$ in the first period.