Faculty of Business and Economics
**Department of Economics**

THE UNIVERSITY OF
MELBOURNE

# Introductory Macroeconomics
### Assignment #2
### Due Wednesday May 12

**Instructions.** You can but do not have to do this assignment in a group. If you work in a group, it can have at most three people. The assignment is due by 4pm on Wednesday May 12.

The submission process will have two steps:

(i) *Group formation*: Students wanting to submit as a group will first need to form their assignment group through the Canvas LMS site (under the People tab), further details to be provided in an LMS announcement during the week commencing 26 April. Students completing the assignment alone do not need to form a group. Assignment groups must be formed no later than 10am on Monday May 10. This is a strict deadline and cannot be extended for any student. Students can form an assignment group with any other students (up to a group size of three), they do not have to be from the same tutorial group.

(ii) *Submission*: Assignments can only be submitted after group formation has closed, i.e., from 10am, May 10. Assignments are submitted through the Assignments section of the Canvas LMS site, details to be provided in an LMS announcement beforehand.

**Late assignments.** Late assignments *will not be accepted*. Please apply for Special Consideration if for some documented reason you cannot submit by the due deadline.

**Marking criteria.** The tutors will mark the assignment according to the following criteria:

- Ability to use material discussed in lectures, tutorials, and other sources to answer the assignment questions in a logical and coherent fashion (90 per cent weight).

- Overall presentation of the assignment. This includes spelling, grammar, correct construction of diagrams, etc. (10 per cent weight).

- The maximum assignment length is 800 words.

- Please note that the University and the teaching staff take academic integrity seriously. Please be aware that plagiarism and collusion are unacceptable. Further details can be found in the subject guide.

**Questions.**

1. **Growth Accounting** (4 marks).

   Below are data on the levels of aggregate output $(Y)$, capital $(K)$, the amount of labour working in production $(L_Y)$, and the population $(L)$ for 2005 and 2011.

   |       | 2005 | 2011  |
   |-------|------|-------|
   | $Y$   | 1    | 1.056 |
   | $K$   | 1    | 1.084 |
   | $L_Y$ | 1    | 0.985 |
   | $L$   | 1    | 1.063 |

   Complete the following table. Then, solve for the average annual growth rate of total factor productivity $(A)$ using the production function $Y_t = A_t K_t^{1/3} L_{Y,t}^{2/3}$. To do so, you should derive a growth accounting formula for $y = Y/L$ and use the values you have entered in the table. (Note: When computing the average annual growth rate, you may report the compound annual growth rate.)

   |                   | 2005 | 2011  | average annual growth rate |
   |-------------------|------|-------|----------------------------|
   | $Y$               | 1    | 1.056 |                            |
   | $K$               | 1    | 1.084 |                            |
   | $L_Y$             | 1    | 0.985 |                            |
   | $L$               | 1    | 1.063 |                            |
   | $y \ (= Y/L)$     | 1    |       |                            |
   | $k \ (= K/L)$     | 1    |       |                            |
   | $l_Y \ (= L_Y/L)$ | 1    |       |                            |

2. **Solow-Swan Model** (6 marks).

   (a) You will demonstrate the importance of diminishing returns to capital in the Solow-Swan model. Draw a Solow-Swan diagram in which there are constant returns to capital. This would happen if the production function were $Y_t = AK_t$, where A = 1. Furthermore, assume that the sum of population growth and the depreciation rate is greater than the saving rate. Does the economy converge to a steady state in this case? To answer this question, you should draw a Solow-Swan diagram in terms of output per person, as we did in class. Use this diagram to explain why the economy converges to a steady state or not.

   (b) Assume, instead, that the sum of population growth and the depreciation rate is equal to the saving rate. Are there steady states? If yes, what is the steady state capital per person? (Note: A Diagram is not needed for this part.)