UNIVERSITY OF OULU

# YLEISEN TENTIN TENTTILOMAKE - GENERAL EXAM FORM

Opiskelija täyttää / Student fills in

| **Opiskelijan nimi / Student name:** | **Opiskelijanumero / Student number:** |
|---|---|
| Click here to enter text. | Click here to enter text. |

Opettaja täyttää / Lecturer fills in

| | |
|---|---|
| **Opintojakson koodi / The code of the course:**<br>721346A | |
| **Opintojakson (tentin) nimi / The name of the course or exam:**<br>Intermediate macroeconomics | |
| **Opintopistemäärä / Credit units:**<br>6<br><br>Mikäli kyseessä on välikoe, opintopistemääräksi täytetään 0 op.<br>0 ECTS Credits is used for mid-term exams. | |
| **Tiedekunta / Faculty:** Oulu Business School | |
| **Tentin pvm / Date of exam:**<br>23.1.2019 | **Tentin kesto tunteina / Exam in hours: 3 h** |
| **Tentaattori(t) / Examiner(s):**<br>Matti Koivuranta | **Sisäinen postiosoite / Internal address:**<br>Matti Koivuranta, OyKKK |
| **Tentissä sallitut apuvälineet / The devices allowed in the exam:** | |
| ☒ Funktiolaskin / Scientific calculator<br>☐ Ohjelmoitava laskin / Programmable calculator<br><br>☐ Muu tentissä sallittu materiaali tai apuvälineet. Tarkenna alla. / Other material or devices, allowed in the exam. Specify below.<br><br>Click here to enter text.<br>☐ Tentissä ei ole sallittua käyttää apuvälineitä / The devices are not allowed in the exam | |
| **Muut tenttiä koskevat ohjeet opiskelijalle (esimerkiksi kuinka moneen kysymyksen opiskelijan tulee vastata) / Other instructions for students e.g. how many questions he/she should answer:**<br><br>All questions should be answered | |

INTERMEDIATE MACROECONOMICS 721346A
2. Exam 23.1.2019
Matti Koivuranta

1. Assume the following Solow growth model. Savings rate is $s$ from which it follows that investments $I$ and consumption $C$ are

$$\begin{aligned} I &= sY \\ C &= (1-s)Y, \end{aligned}$$

where $Y$ is production. Production function is of Cobb-Douglas form:

$$Y = K^{\theta}N^{1-\theta}.$$

In above equation $K$ is capital stock which has law of motion

$$K' = (1-d)K + I,$$

where $d$ is the depreciation rate. Second argument of production function is labor force $N$. Labor force grows with rate $n$:

$$N' = (1+n)N.$$

Parameters have following restrictions:

$$\begin{aligned} &0 < s < 1 \\ &0 < \theta < 1 \\ &0 < d < 1 \\ &n \geq 0. \end{aligned}$$

   a) Derive the law of motion for capital per capita $(K/N)$.
   b) Show that capital per capita $(K/N)$ has a strictly positive steady state which is stable.
   c) What does golden rule mean within the Solow model?

2. a) What does *neutrality of money mean*?
   b) What does *Ricardian equivalence mean*?
   c) What does *government expenditure multiplier*mean?

3. Following figure depicts the equilibrium of the closed economy one period model. Analyze graphically the effects of an increase in government spending $G$. In particular, find out what happens to employment, output, consumption and real wage.