Write your identification number on each paper and cover sheet (the number stated in the upper right hand corner on your exam cover).

Use one cover sheet per question. Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked.

The exam consists of 4 questions. The first two questions are worth 20 points each. Question 3 is worth 35 points, and question 4 is worth 25 points, for 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 85 points.

Your results will be made available on your “My Studies” account (www.mitt.su.se) 15 working days after the exam, at the latest.

Good luck!
Short essay

About a page per question (max 2 pages) should be used to answer each question. Worth 20 points each.

1. Explain the following concepts/measures:
   (a) Within the context of the Solow model, explain the difference between "convergence" and "conditional convergence".
   (b) Explain the difference between the headcount ratio and the poverty gap index.

2. Discuss the research design, including the identifying assumption, and the key empirical findings in Acemoglu and Johnson’s (2007) study on the effect of life expectancy on economic growth.
Problems

Question 3 is worth 35 points. Question 4 is worth 25 points.

3. Consider a model with a risk-neutral landlord and a risk-neutral tenant. The tenant’s output (working on the landlord’s land) is

\[ y = e + \theta \]

where \( \theta \sim N(0, \sigma^2) \) is a normally distributed random shock term with 0 mean and variance \( \sigma^2 \) and \( e \) is effort exerted by the tenant.

The landlord does not observe \( e \) or \( \theta \) but observes \( y \). Assume the landlord offers a tenancy contract to the tenant of the form

\[ y_T = \alpha y - R \]

where \( y_T \) is the tenant’s total income, \( \alpha \) is the sharing rule, and \( R \) is a fixed rental payment.

Assume the cost of exerting effort (for the tenant) is

\[ c(e) = \frac{1}{2} ce^2 \]

where \( c > 0 \). Assume further that the tenant’s outside option pays \( m \).

(a) Solve for the optimal sharecropping rule; i.e. \( \alpha \), and fixed rental payment \( R \), and interpret your results.

(b) Assume now instead that the tenant is risk-averse with an expected welfare function \( W = E [u(y)] - \frac{1}{2} ce^2 \), where

\[ E [u(y)] = E [y] - \frac{r}{2} Var [y] \]

where \( E [y] \) is the mean of \( y \), \( Var [y] \) is the variance of \( y \), and \( r \) the coefficient of risk aversion.

Solve for the optimal sharecropping rule; i.e. \( \alpha \), and interpret your results.
4. Consider a Solow growth model with output given by

\[ Y = K^{\alpha} (AL)^{1-\alpha-\beta} T^\beta \]

where \( \alpha + \beta < 1 \) and \( T \) is the fixed amount of land and \( A = e^{gt} \) with \( g \) being the growth in productivity. The capital stock evolves according to

\[ \dot{K} = sY - \delta K \]

and \( L \) is labor.

(a) Assume \( T = 1 \) and that there is no population growth and that \( g = 0 \). Solve for the steady state income per capita.

(b) Assume \( g > 0 \) and \( L = L_0 e^{nt} \) where \( n > 0 \) is the population growth rate. Solve for growth in per capita income along a balanced growth path (steady state).