Midterm Exam

Name: ....

PLEASE NOTE THAT YOU HAVE TO HAVE MIN 2 POINTS FROM EACH PART!

Computational exercises (7 points):

Exercise 1 - Ramsey model (2 points):
In the Ramsey model, describe how a rise in the preference for today's consumption θ affects the $\dot{k} = 0$ and $\dot{c} = 0$ locus. How does c and k react immediately after change and what is the new steady state?

Exercise 2 - Solow model (2 points):
Imagine that the rate of technological progress rises. How will it, if at all, affect the break-even and actual investment lines in the basic Solow model diagram + what is the new equilibrium and how will economy converge to it?

Exercise 3 - Labour input optimisation (3 points):
Assume an individual optimising consumption and labor input in two periods with utility function

$$u(c_1, l_1, c_2, l_2) = \ln c_1 + b \ln(1 - l_1) + \frac{1}{1 + \rho}[\ln c_2 + b \ln(1 - l_2)]$$

- Write down the intertemporal budget constraint of an individual, if we assume that he gets wage w_1 and w_2 in the first and second period, respectively. He can use this income either for consumption or to invest at the interest rate r.

- Write down Lagrangian and the F.O.C's with respect to first and second period's labor input.

- Write down the expression relating the choice of labour input in the first and second period, and explain how it depends on the relative wage.

Empirics (7 points)

1. *The Penn Effect:* Classical economics made simple predictions about exchange rates; it was said that a basket of goods would cost roughly the same amount everywhere in the world, when paid for in some common currency. This is called the purchasing power parity (PPP) hypothesis, also expressed as saying that the real exchange rate between goods in various countries should be close to one. Fluctuations over time were expected by this theory but were predicted to be small and non-systematic.

Pre-1940, the PPP hypothesis found econometric support, but some time after the Second World War, a series of studies by a Penn team documented a modern relationship: countries with higher incomes consistently had higher prices of domestically produced goods (as measured by comparable price indices), relative to prices of goods included in the exchange rate.

In 1964 the modern theoretical interpretation was set down as the Balassa-Samuelson effect, with studies since then consistently confirming the original Penn effect. The causal mechanism behind the model is as follows: Each economy can be divided into two sectors: tradable and non-tradable goods, but still it has one labour market. Prices in the tradable sector correspond to world prices, on the other hand the prices of nontradable goods are set on local markets. Less developed countries have low productivity in tradable sector and this sector determine the wage level in the economy as a whole. Through this wage channel lower price level spreads in the economy.

Here is the scatter plot with an OLS line of price level and gdp per head in OECD countries as of 2003 (GDP on horizontal, Price level on vertical axis).
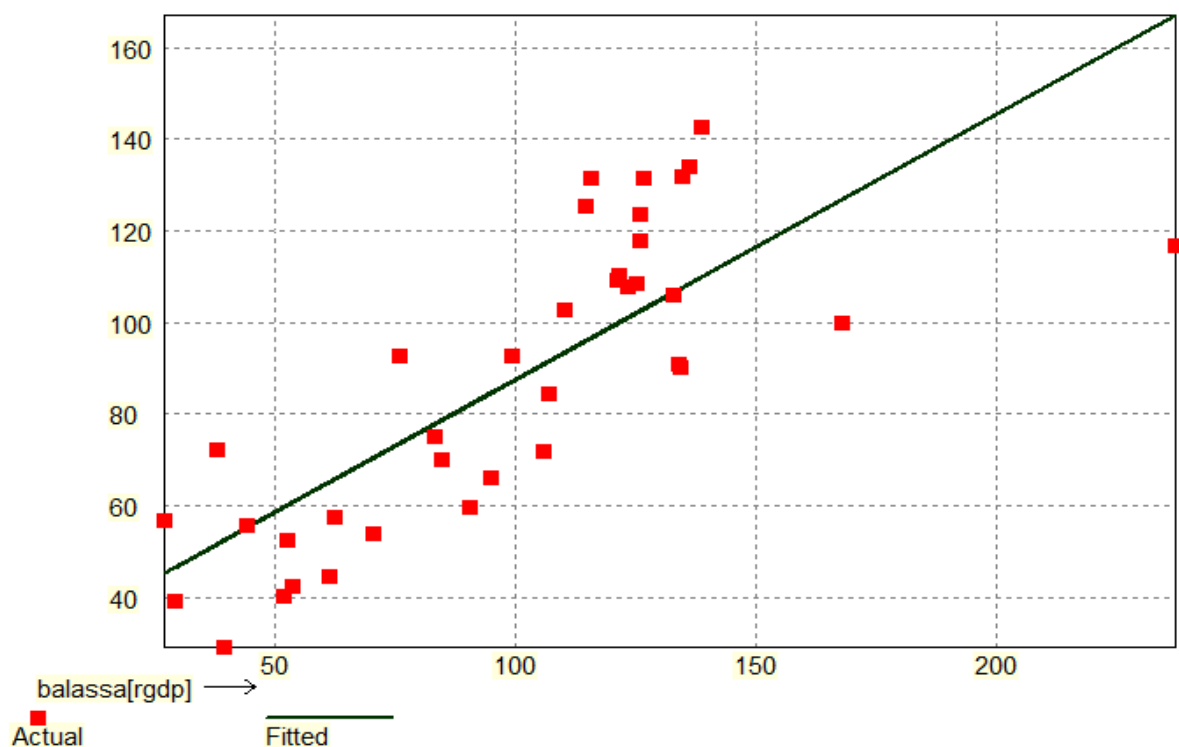
The output of regression follows:

```
      Dependent variable: Price level
      Number of observations: 37
      Variable              Coefficient   St. Error       t-statistic     Sign.
  1 Constant             29.428494324   8.4852721923   3.4681850691   [0.0014]
  2 Real GDP              0.5801301382   0.0779731574   7.4401262855   [0.0000]
     R^2adj. = 60.157369159%    DW = 1.4041
     Normality: Chi^2(2) = 0.550738 [0.7593]
     Heteroskedasticity: Chi^2(1) = 17.30531 [0.0000]
     Functional form: Chi^2(1) = 8.277791 [0.0040]
     AR(1) in the error: Chi^2(1) = 2.698869 [0.1004]
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From the scatter plot and from the regression output:

a) Can you say whether the Penn effect is present in the data?   YES/NO

b) Explain why (without explanation the answer to a) will be evaluated as incorrect)

c) Is anything wrong with this regression, based on the tests results reported here? Why?

d) Based on your answer in c) and the scatter plot suggest something that could help to solve your problem and explain why do you think it will help.

e) Bonus question:The Balassa Samuelson effect was often mentioned in the discussion of the Euro adoption in countries in the Central and Eastern Europe. Why?

2. What is the Hodrick-Prescott filter good for? What is the role of the myserious letter lambda (the only one parameter that needs to be set) in the Hodrick-Prescott filter? Explain briefly the consequences of lambda at 10, 1600 and 1000000 on a time series with quarterly data.

Short questions (8 points):

1. Write down the key equation of the Solow Swan model + explain.

2. What equation must the golden rule level of capital stock satisfy? Explain why.

3. Explain following equation: $\frac{\dot{c_t}}{c_t} = \frac{1}{\theta}[f'(k_t) - \rho - \theta g]$

4. What is the difference between distortionary and non-distortionary taxation?

5. In the Diamond model, for which θ is the income effect of the increase in r higher than the substitution effect?

6. What is learning by doing and how does it connect to capital spillovers?

7. Give me a reason for costs of R&D to be a positive (negative) function of number of intermediate goods N.

8. What is the propagation mechanism of shocks in RBC model?