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Student id: \_\_\_\_\_

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**College of Business Administration  
Department of Economics  
Aggregate Economic Conditions & Analysis  
Lecturer: O. Mikhail  
ECO 6206-0001  
Spring 2003**

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## **Mid-Term Exam**

- This closed book exam is worth 100 points.
- Questions I, II, III, IV, V and VI are worth 10 points, each.  
Questions VII and VIII are worth 20 points, each.  
Allocate your time accordingly.
- Including the cover page, the exam totals 6 pages.
- Answer all questions.
- Non-Programmable calculators and language dictionaries are allowed.
- DO NOT forget to write your name, your student id on the exam booklet.

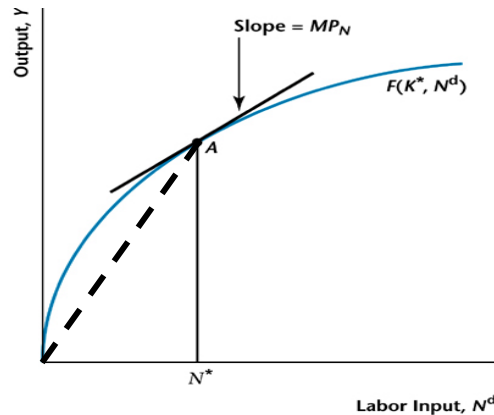
**6:00 p.m. – 8:00 p.m.**

**BA 207**

**March 12, 2002**

## Question I (10 points) Productivity

A popular measure of (average) productivity is the ratio of output (i.e. GDP) to employment (i.e. worker-hours). In the graph of the production function,



The average productivity at point A equals the slope of the dashed line that is drawn from the origin to intersect the production function at point A.

- Show graphically, that average productivity ( $Y/N$ ) always exceeds the marginal product of labor  $MP_N$ .
- Consider a technological change that shifts the production function upward proportionately at all levels of  $N$ . What happens to work effort, output, and average productivity?
- Assume that the form of the production function does not change. But suppose that people shift their tastes and become more willing to work. That is, at the initial levels of work and consumption, each person requires a smaller addition in consumption to give up a unit of leisure. What happens to the choices of work effort, output and to average productivity?

### Answers

- The slope of the line from the origin always exceeds the slope of the production function at any point. This is a property from the concavity of the function.
- $N$  may increase or decrease, depending on the wealth and substitution effects. Output rises. It will take a large substitution effect for productivity to fall. The presumption is that productivity will rise.
- Labor supply and output will rise. Productivity falls.

## Question II (10 points)

What are the effects of the following changes on current consumption and hours worked. Distinguish clearly between wealth effects and substitution effects.

- a) A permanent parallel shift of the production function.

A large 'pure' wealth effect, C and work fall.

- b) A change in the interest rate.

An Intertemporal substitution effect, C falls and work rises.

- c) A temporary change in the marginal product of labor.

Labor/Leisure substitution effects, C and work rise.

## Question III (10 points)

1) Why is a change in the price level not effective in reducing excess demand or supply in the commodity market? Explain how a change in the price level can ensure that the outstanding quantity of money is held willingly.

Supply and demand are affected by relative prices only. Clearing the money market is through the price level effect in the bonds market.

2) Assume a one-time decrease in population, possibly caused by an onset of plague or a sudden out-migration. The people who left are the same as those who remain in terms of productivity and tastes. The aggregate quantity of money does not change.

What happens to aggregate output Y, work effort L, the interest rate R and the price level P? Explain your answer and supplement it with a graph whenever possible.

Y falls, L falls, R is unchanged and P rises.

## Question IV (10 points)

Use the aggregate form of households' budget constraints to derive Walras' law of markets. How does this law differ if the labor market is included? [Hint: write the aggregate form of the budget for the two cases: 1) labor market excluded and 2) labor market included]

Without the labor market:

$$(C^d - Y^s) + (M^d/P - M/P) + (B^d/P) = 0$$

With the labor market:

$$(C^d - Y^s) + (M^d/P - M/P) + (B^d/P) + (W/P) (L^d - L^s) = 0$$

## Question V (10 points)

Can the government always increase its revenue by raising the rate of monetary growth? How does the answer depend on the response of real money demanded to the nominal interest rate?

No. If the demand for real balances is very responsive to the nominal interest rate, real revenue may decline.

## Question VI (10 points)

Consider an individual who lives for two periods, earns a nominal income of \$1000 in each period, and has zero initial and terminal assets. The nominal interest rate,  $R$ , on dollar loans is 15%, and the expected rate of inflation  $\pi^e$ , between the two periods is 10%. Assume that the price level in the first period is 1.

- a) What is the real value of period 1 income?  
1000 goods
- b) What is the maximum amount of dollars that could be borrowed in period 1? Find the real value of this amount, and add it to the real value of period 1 income to see the maximum amount of (real) consumption possible in period 1.  
\$869.57 which is the present value of \$1000 next period using 15% as the discount rate. The maximum real consumption is 1869.57 goods.
- c) What is the price level in period 2? What is the real value of period 2 income?  
1.10 and 1954.55 goods
- d) Plot a graph to show the consumption possibilities in the two periods. What is the slope of the consumption possibilities line?  
Slope equals  $-(1+R)/(1+\pi^e) = -1.045$

## Question VII (20 points)

True, False or Uncertain. Explain your answer. Each is worth 5 points.

For a given values of real income and spending, the interest rate, and real transaction costs, state if the following statement is true, false or uncertain. Briefly, explain your answer.

- a) An agricultural society has lower real money demand than an industrial society.

True. In industrial societies work is more specialized and more transactions take place

- b) Real money demand is higher in dictatorships than in democracies.

True. In a dictatorship economy people worry of confiscation of assets. Hence, they keep their assets in a portable form, such as money. Also, dictatorships countries are more likely to have a black market that requires cash for exchanges.

- c) A country with a large fraction of elderly people has higher real money demand than a country with a small fraction of elderly.

True. Presumably older people save for their retirement and some of this saving may take the form of money.

- d) A country with a higher literacy rate has lower real money demand.

True for currency. Uncertain for broader measures of money. People are better able to manage their holding of money.

## Question VIII: (20 points)

Consider the Robinson Crusoe (RC) economy. There is a single good (coconuts) which can be produced with labor. RC's production function is

$$y = f(n) = \alpha + \beta n^\gamma$$

where  $n$  denotes labor and  $y$  denotes output.  $\alpha$  and  $\beta$  are positive constant and  $\gamma$  is a parameter with a value in the open interval  $(0,1)$ .

RC's preferences over leisure ( $l$ ) and the consumption of coconuts ( $c$ ) are presented by the utility function

$$U(c,l) = c^\delta l$$

where  $\delta$  is a positive constant in  $(0,1)$ .

Finally, RC has a limited amount of time per period, normalized to 1, so that

$$n + l = 1$$

- a) What is the economic interpretation of  $\alpha$  and  $\beta$ ? Graph the production function in  $(y,n)$  space. Does this production display a falling marginal product of labor? How is it affected by the values of  $\alpha$  and  $\beta$ ?
- b) Give an expression for the marginal rate of substitution (MRS) between consumption and leisure. Are RC's preferences over  $c$  and  $l$  convex? What is the meaning of  $\delta$ ? Explain the intuition of why changes in  $\delta$  affect the MRS.

$$\text{MRS} = c / \delta \text{ leisure}$$