ECON 330: Midterm Examination I

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Only answers in your booklet will be graded. Please write your answers legibly. Do not turn this cover page before you are told to do so. The exam starts at 8.35am and stops at 9.55am. The usual disclaimer regarding to cheating applies.

GOOD LUCK!

1. **Measurement** (22pts)

Year	Computers sold	Price per computer	Cars sold	Price per car
2000	500,000	$6,000	1,000,000	$12,000
2010	5,000,000	$2,000	1,500,000	$20,000

Table 1

a. (4pts) Define nominal and real GDP and explain why the distinction is important.

b. (i) (2pts) Calculate nominal GDP in 2000 and 2010.
(ii) (4pts) Calculate real GDP in 2000 and 2010 using 2000 as the base year; calculate growth in real GDP using 2000 as the base year.
(iii) (4pts) Calculate real GDP in 2000 and 2010 using 2010 as the base year; calculate growth in real GDP using 2010 as the base year.
(iv) (2pts) Explain why the growth rates of real GDP differ depending on the choice of the base year.

c. (i) (4pts) Calculate the CPI in 2010 when the base year is 2000 and the fixed basket of goods is made up of the number computers and cars purchased in 2000; calculate the GDP deflator in 2010 using 2000 as the base year.
(ii) (2pts) What is the percentage change in the price level based on these two measures?

2. **Basics of classical theory** (50pts)

a. (15pts) What are factors of production? What are factor prices? What is a production function? Explain constant returns to scale. Explain diminishing returns to factors of production.

b. (15pts) Explain the competitive firm's problem, i.e., What is the firm's objective? What are the endogenous variables? What are the exogenous variables? How is the solution to the firms's problem characterized? Explain the economic intuition behind this characterization.

c. When the production function is of the form $Y = K^{\alpha}L^{1-\alpha}$ we know that the marginal products are given by (here $P = 1$):

$$MPK = \alpha\frac{Y}{K} \quad \text{and} \quad MPL = (1-\alpha)\frac{Y}{L}.$$

(i) (10pts) Find the algebraic form of the labor demand curve and capital demand curve (hint: use the characterization of the solution to the firm's problem, substitute the expression for the production function and solve for L and K, respectively.)
(ii) (5pts) Set $\alpha = 0.5$ and $\bar{K} = 1$. Calculate labor demand when $w = 0.1$, $w = 0.125$, and $w = 0.2$; plot the three points on a diagram with quantity of labor on the horizontal axis and the wage rate on the vertical axis and connect the points.
(iii) (5pts) When $\alpha = 0.5$ and $\bar{K} = 1$, calculate the equilibrium wage rate if labor supply is given by $\bar{L} = 10$. What is the numerical value for the equilibrium interest rate?

3. **Basics of the one-period model** (28pts)

a. (10pts) Explain the consumer's problem, i.e., What is the consumer's objective? What are the endogenous variables? What are the exogenous variables? How is the solution to the consumer's problem characterized? Explain the economic intuition behind this characterization.

b. (10pts) Draw an indifference curve for standard preferences, for perfect substitutes and for perfect complements. Briefly explain their differing shapes referring to the MRS_{xy}, where x is the good measured along the horizontal axis and y is the good measured along the vertical axis.

c. (8pts) Suppose that a consumer has 16 hours of time available. If the consumer works up to, and including, 8 hours his wage rate equals w_1; hours worked above 8 hours are compensated by a higher wage rate w_2. Suppose that there are neither taxes nor dividend income. Write down the algebraic expression for the consumer's budget constraint and graph it in a carefully labeled diagram.