

Midterm Exam

Tuesday, October 31

1 hour, 15 minutes

Name: _____

Instructions

1. This is closed book, closed notes exam.
2. No calculators of any kind are allowed.
3. Show all the calculations.
4. If you need more space, use the back of the page.
5. Fully label all graphs.

Good Luck ☺

1. (30 points). Consider the Classical model studied in class, and briefly described as follows. The consumer derives utility from consumption C and leisure l according to $U(C, l) = \alpha \ln C + (1 - \alpha) \ln l$. He is endowed with h hours which he can allocate between leisure and work L_s . The real wage is w . The consumer owns a firm and receives dividend income (profit) π . The firm produces output Y using technology $Y = AK^\theta L_D^{1-\theta}$, where A is productivity parameter (TFP), K is the capital owned by the firm, and L_D is labor employed by the firm. The government taxes all income at the rate of t and balances its budget: $G = (wL + \pi)t$, where L is labor.
 - a. (10 points). Write the firm's problem and solve for the labor demand.

- b. (10 points). Using fully labeled graphs of the production function and labor market, illustrate the effect of a technological progress ($A \uparrow$) on equilibrium output (Y^*), equilibrium real wage (w^*) and equilibrium employment (L^*).

- c. (9 points). Summarize your results in the following table. Use \uparrow to denote an increase in the variable, \downarrow to denote a decrease in the variable, ? to denote that the change is ambiguous, and a bar on top of the variable (e.g. \bar{Y}^*) to denote that the variable does not change.

Y^*	w^*	L^*
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3. (15 points). Consider the search model of unemployment, briefly described as follows.

	Unemployed	Employed
Fraction in population	U	$1 - U$
Utility	$V_u(b, p, t_b)$ + + -	$V_e(w, s, t_w)$ + - -
	b – unemployment insurance benefit p – probability of receiving a job offer t_b – tax on b	w – real wage s – separation rate (probability of losing the job) t_w – tax on w

The symbols “+” under variable of the utility function indicates the assumption that the utility is increasing in that variable, and “-” under a variable indicates that the utility is decreasing in that variable.

Distribution of wage offers: $H(w)$ gives the probability that an offer is at least w .

Illustrate with 3 fully labeled graph the impact of an increase in unemployment benefit (b) on: (1) reservation wage w^* , (2) probability of acceptance of job offers $H(w^*)$, and (3) steady-state unemployment rate U^* .

4. (10 points). Suppose that in some economy the private saving is 30, the domestic investment is 35, and the government runs a deficit of 2. What must be the trade deficit in that country? Show your calculations.
5. (15 points). Consider the two-period model discussed in the notes. There are N identical consumers that live for two periods (1 and 2) and derive utility from consumption c_1 and c_2 in the two periods: $U(c_1, c_2)$. Consumers receive income y_1 and y_2 in the two periods and pay a lump sum tax t_1 and t_2 to the government. The consumers decide how much to consume in each period and how much to save in the first period. We denote the saving in the first period by s . Consumers can borrow and lend at real interest rate r , which is assumed exogenously given. Thus the budget constraints in the two periods are

$$BC_1: c_1 + s = y_1 - t_1$$

$$BC_2: c_2 = y_2 - t_2 + (1+r)s$$

The government collects tax revenues $T_1 = N \cdot t_1$ and $T_2 = N \cdot t_2$, and spends G_1 and G_2 in the two periods. The government can borrow and lend at real interest rate r with the constraint that the present value of spending = present value of taxes

$$G_1 + \frac{G_2}{1+r} = T_1 + \frac{T_2}{1+r}$$

- a. (5 points). Derive the consumers' lifetime budget constraint from their budget constraints in each period, and give the economic interpretation of the left hand side and the right hand side of the lifetime budget constraint.

b. (5 points). Draw a fully labeled graph of the lifetime budget constraint with a tangent indifference curve indicating the optimal choice for a borrower. Label the saving on your graph.

c. (5 points). An increase in current income y_1 will increase the current consumption c_1 by the same amount (i.e. $\Delta c_1 = \Delta y_1$). True/false, prove your answer.