

Intermediate Microeconomics

Fall 2025 - M. Chen, M. Pak, and B. Xu

Midterm examination: You must show your work.

Name (official) and Student ID:

Name in Pinyin (if any):

1. [20] Consider a two-period consumption model in which the individual's lifetime utility is $u(c_1, c_2) = \min\{c_1, \frac{c_2}{2}\}$, and the individual has income $I_1 > 0$ in period 1 and $I_2 \geq 0$ in period 2. Assume that the price levels are $p_1 = p_2 = 1$, and the individual can save or borrow freely at net interest rate $r > 0$.
 - (a) [7] Suppose $I_2 = 0$. Find the optimal consumption in each period and the optimal savings.
 - (b) [7] Still assuming $I_2 = 0$, find the substitution effect, the income effect, and the total effect on the consumption in period 1 when the interest rate rises from $r = 0.1$ to $r' = 0.2$. Is the individual better off or worse off?
 - (c) [6] Now suppose $I_2 > 0$. When will the individual become a borrower? Give an intuitive, verbal explanation of the condition you find.

2. [20] Consider a leisure-consumption model in which an individual's utility over leisure and a consumption good is $u(L, Y) = 2L^{\frac{1}{2}} + Y$. Assume that the total amount of time available is $\bar{L}$, and let w be the wage (per unit of time) and p be the price of the consumption good.
- (a) [8] Find the condition under which the individual does not work.
 - (b) [4] Give an intuitive, verbal explanation of why the individual does not work in part (a) even though the individual derives positive utility from consumption.
 - (c) [8] To help the poor and stimulate consumption, the government gives a basic income B to the individual. (Basic income is a lump-sum cash given to the individual without any condition or requirement.) Suppose the government finds that the individual's consumption increases by $\frac{B}{p}$ but the individual still does not work. Explain whether the government should conclude that basic income can stimulate consumption but cannot encourage the individual to work.

3. [20] A strictly risk averse individual has initial wealth W RMB and a lottery ticket. The lottery ticket pays 100 RMB with probability a and nothing with probability $1 - a$. Suppose an insurance company offers an “insurance” at a price of p RMB per unit. Each unit of insurance gives the individual 1 RMB if she does not win the lottery (i.e., gets 0 RMB in the lottery) and nothing if she wins (i.e., gets 100 RMB in the lottery).
- (a) [5] What is the individual’s expected utility from buying x units of insurance? Determine the fair price for the insurance.
 - (b) [5] Find the optimal amount of insurance to buy at the fair price.
 - (c) [5] Suppose the price of insurance is greater than the fair price. Show whether the individual will under insure, fully insure, or over insure.
 - (d) [5] Suppose the individual’s utility over money is $u(w) = \ln w$, and $a = \frac{1}{2}$ and $p = \frac{3}{4}$. Find the optimal amount of insurance to buy.

4. [20] A firm's production function is $f(L, K) = L^{\frac{1}{9}} K^{\frac{2}{9}}$. Assume we are in the long-run time frame, and let w, r, p be the price of labor, capital, and the output good, respectively.
- (a) [10] Find the firm's optimal input choices and the cost function.
 - (b) [5] Find the firm's profit maximizing output level.
 - (c) [5] Suppose the government decides to collect t RMB in tax from the firm for each unit the firm sells. What happens to the firm's supply curve? What happens to the firm's supply curve if, instead of taxing the output good, the government decides to collect t RMB for each unit of labor the firm hires?

5. [20] Consider a competitive market where the demand is given by $q^D = 100 - p$ and the (domestic) supply is given by $q^S = p$.
- (a) [5] Find the equilibrium and the aggregate surplus.
 - (b) [8] Suppose the market opens to international trade, and foreign producers enter the market. Suppose the foreign supply is given by $q^{FS} = 3p$ (note that foreign supply curve is also upward sloping). What is the resulting change in the aggregate surplus (this is called the gains from the trade).
 - (c) [7] Suppose the government decides to impose an ad valorem tax to foreign producers (but not the domestic producers). That is, for each unit foreign producers sell in this market, they have to give tp to the government, where $t = \frac{1}{3}$ is the tax rate and p is the price the buyers pay. What is the tax revenue and the incidence of tax? Is it the case that this tax on import only hurts the foreign producers?

