

Econ 100A: Intermediate Microeconomics
Problem Set 1
Due in class Friday Oct. 14

1. Supply and demand

Suppose the demand curve is given by $Q^D = 20 - 2P$. Supply is $Q^S = 2P$.

- Write the inverse demand curve. What is the marginal willingness to pay for the 5th unit?
- What is the equilibrium price? What is the equilibrium quantity?
- Find the price elasticity of demand. What is the price elasticity at the market equilibrium? Is demand elastic or inelastic at that price?
- Consider an alternative supply curve, $Q^S = 5$. What is the price that clears the market?
- If the demand curve were to shift to $Q^D = 30 - 2P$, how would price change under the original supply curve provided? How would it change under the supply curve given in part d? Explain how these differ and why.

2. Preferences problem

Suppose utility over two goods, x_1 and x_2 , is given by $U(x_1, x_2) = \ln(x_1) + 2x_2$.

- Find the marginal utility of goods 1 and 2. Does a person with these preferences prefer more to less? Does this utility function exhibit diminishing marginal utility?
- What is the marginal rate of substitution? Is the MRS diminishing?
- Plot a typical indifference curve. Does the indifference curve intercept an axis on the graph?

3. Constrained optimization problem

A consumer is choosing how much food and clothing to buy. Suppose the price of food is \$2 per unit, and the price of clothing is \$4. Income is \$100. Find the optimal basket of food and clothing for each of the following utility functions.

- $U(F, C) = F^{1/4}C^{3/4}$
- $U(F, C) = .25\ln(F) + .75\ln(C)$
- $U(F, C) = \ln(F) + 4C$
- $U(F, C) = F + 3C$

4. Demand

Preferences for food and clothing are given by $U(F, C) = \ln(F) + \ln(C)$. The price of food and clothing is p_F and p_C , respectively. Income is I .

- Find the demand functions for F and C .
- What is the income elasticity of demand for food?
- Suppose the price of food is \$1 and clothing is \$1. On a graph, plot the optimal basket for incomes $I=10$, $I=20$ and $I=30$. Draw the income consumption curve and Engel curve.
- Suppose income is $I=\$30$ and the price of food is $p_F=1$. On a graph, plot the optimal basket for a price of clothing of $p_C=1$, $p_C=2$, $p_C=3$. Use these to plot the price consumption curve and the demand curve.