

# Microeconomics

## 1. True/False Questions (*TOTAL: 20 points*):

*In this section, write whether each statement is True or False. Please fully explain your answer, using a diagram if appropriate. No credit will be given for an answer without an explanation.*

(a) (*5 points*) A risk averse individual that has to decide between two different lotteries will always prefer a lottery with less risk.

(b) (*5 points*) Steven only consumes two goods: X and Y. If X is a Giffen good for Steven, then Y must be a normal good for Steven.

(c) (5 points) Ann and Bob consume clothes (C) and food (F) only. Ann's utility function is  $U(C, F) = a_A \ln C + b_A \ln F$ , and Bob's utility function is  $U(C, F) = a_B \ln C + b_B \ln F$ .  $a_A, b_A, a_B, b_B > 0$ . The price of clothes is  $P_C$ , and the price of food is  $P_F$ . Ann and Bob must have the same marginal rates of substitution (MRS) of clothes for food at the optimal level of consumption.

(d) (5 points) If S and F are perfect complements you must be indifferent between these two bundles:

- i. One unit of S and one unit of F
- ii. Two units of S and one unit of F

**2. Short Answer Questions** (*TOTAL: 10 points*):

(a) (*4 points*) Mary's demand curve for food is  $Q = 10 - 2P$ . Her price elasticity of demand for food at price  $P^*$  equals  $-\frac{2}{3}$ . How much is  $P^*$ ?

(b) (6 points) Ann and Bob are a couple. They are the only people in the family. Bob's inverse demand curve for shirts is  $P = 5 - \frac{1}{2}Q_B$ . Ann's inverse demand curve for shirts is  $P = 10 - 2Q_A$ . What is their family demand function for shirts? What is their family consumption of shirts when the price is 4? What's their family consumption of shirts when the price is 6?

**Long Questions:**

3. (15 points) Jane has utility function over her net income  $U(I) = \sqrt{I}$

(a) (2 points) What are Jane's preferences towards risk? Is she risk averse, risk neutral or risk loving? [Explain briefly your answer]

(b) (6 points) Jane drives to work every day and she spends a lot of money in parking meters. Many days the thought of cheating and not paying for parking crosses her mind. However she knows that there is a  $\frac{1}{4}$  probability of being caught in a given day if she cheats, and that the cost of the ticket is \$36. Her daily income is \$100. What is the maximum amount of she will be willing to pay for one day parking? [Hint: by paying that amount she avoids the risk of getting a ticket!].

(c) (2 points) Paul also faces the same dilemma every single day. But he has a utility function  $U(I)=I$ . His daily income is also \$100. What are Paul's preferences towards risk? Is he risk averse, risk neutral or risk loving?

(d) (5 points) If the price of one day parking is 9.25, will Paul cheat or pay the parking meter? Will Jane cheat or pay the parking meter under this price?

4. (25 points) In Country Faraway, cigarettes are forbidden, so people trade cigarettes in a black market. The cigarette demand is  $Q_D = 12 - P$ , and the cigarette supply is  $Q_S = 2P$ .

(a) (3 points) Find the equilibrium price and quantity in the black market.

(b) (6 points) The government becomes aware of the black market and reinforces the police so that half of the cigarette supply would be seized and destroyed. Under this circumstance, what are the demand and supply functions? What is the new equilibrium price and quantity? Show the change by using a supply and demand diagram.

(c) (4 points) How does the consumer surplus change between (a) and (b)?

(d) (8 points) Suppose that the government changes the policy and legalizes cigarette trade. Now cigarettes are traded in an open market. However, for every unit of cigarette purchased, the buyer has to pay tax  $T$  to the government.  $T$  is equal to the pre-tax price  $P$ . What are the demand and supply functions under this circumstance? What are the equilibrium (pre-tax) price and quantity? What is the after-tax price paid by buyers?



- (e) (4 points) Compare (b) and (d). Which policy do consumers prefer? Which policy does the government prefer? Why?

5. (29 points) Eric receives utility from days spent traveling on vacation domestically (D) and days spent traveling in a foreign country (F) as given by the utility  $U(D, F) = DF$ . The price of a day spent traveling domestically is \$160 and in a foreign country \$200. Eric's annual budget for traveling is \$8,000.

(a) (5 points) Find Eric's utility maximizing choice of days traveling domestically and in a foreign country. Find also his utility level from consuming that bundle.

(b) (6 points) Suppose that the price of domestic traveling increases to \$250 per day. Calling his budget for traveling  $x$ , (suppose by now that it is unknown) find the demand for D and F under the new prices as a function of  $x$ .

(c) (4 points) Find the income necessary to make Eric reach the same utility level as before the price change.

(d) (2 points) Compute the quantities demanded with the new prices and the income you found in section c.

(e) (2 points) Compute the quantities demanded with the new prices and the original income.

(f) (6 points) Using your previous answers tell us what is the total change in quantity of D due to the price increase in  $P_D$  that the consumer experiences and what part of that change is due to income or substitution effects. Give definitions of what income and substitution effects mean.

(g) (4 points) Draw a graph showing the income and substitution effects you found.