

**SUPPLY & DEMAND AND CONSUMER CHOICE**

Graded satisfactory (2% of course grade) or unsatisfactory (0% of grade).

Satisfactory means a serious attempt made to answer the questions. Your answers need not be lengthy. No credit for late assignments. Academic honesty is required.

1. Econometric analysis leads to the following estimated linear supply and demand relationships in the U.S. market for soda:

$$\text{Demand: } Q = 130 - 2P$$

$$\text{Supply: } Q = -20 + P$$

where  $Q$  is in billions of cans and  $P$  is the price per can in cents.

(a) Give the formulae for the demand and supply curves, where  $P$  is expressed as a function of  $Q$  (rather than  $Q$  expressed as a function of  $P$ ), and plot the corresponding graphs.

(b) Algebraically obtain the equilibrium price and quantity of soda in the U.S.

(c) The government institutes a price floor (below which the price cannot fall) of 40 cents per can. What will be the amount of excess supply, if any?

2. Given the following data for an average college student:

Indifference Curve:		Budget Data:
Bread Rolls	Pizza	The average student has a budget of \$80 per month.
100	2	Bread costs \$1.00 per roll.
67	3	Pizza costs \$8.00.
50	4	
40	5	
33	6	
25	8	

(a) Construct a budget line and an indifference curve for the student.

(Put pizza on the horizontal axis).

(b) What is the marginal rate of substitution of bread for pizza as pizza consumption increases from 2 to 4 pizzas?

(c) What is the relative price of pizza in terms of bread.

(d) By plotting this indifference curve, find the equilibrium composition of goods the student should purchase to maximize utility.

3. What assumption (if any) needs to be made about a consumer's preferences to ensure:

(a) indifference curves do not cross

(b) indifference curves slope downwards

(c) indifference curves are convex to the origin.

4. An example of an indifference map is the family of indifference curves  $Y = a/X$ , where higher values of the parameter  $a$  give higher indifference curves. We consider the particular indifference curve given by  $Y = 200/X$ .

(a) Obtain the values of  $Y$  along this indifference curve, for  $X = 2, 3, 4, 5, 6$  and  $8$ .

(b) For this indifference curve, i.e.  $Y = 200/X$ , obtain the exact formula for the marginal rate of substitution between goods  $X$  and  $Y$ , using calculus methods.

Hint: Recall that  $MRS_{yx}$  equals minus the slope of the indifference curve.

(c) Verify, by calculus methods, that  $MRS_{yx}$  is diminishing for this indifference curve.

(d) Good  $X$  sells for \$8 per unit, and good  $Y$  sells for \$1. Income is \$80.

Verify that  $MRS_{yx} = P_x / P_y$  at  $X = 5$  (and  $Y = 40$ ).

(e) Verify that at this point George's income is just exhausted.

(Conclude that this is a consumer equilibrium).

5.(a) Two consumers facing the same prices and with the same income, nonetheless choose to consume different amounts of clothing. Is this consistent with indifference curve analysis? Use indifference curves and budget lines to illustrate your answer.

(b) A consumer chooses not to consume alcohol. Is this consistent with the assumption of diminishing rates of marginal substitution? Use indifference curves and budget lines to illustrate your answer.

(c) A ration on a good can make a consumer worse off. Illustrate this using indifference curves and budget lines.

6. Suppose a California water utility encourages water conservation by adopting the following price schedule for water. Water sells for 0.3 cents per gallon for the first 200 gallons per day, and for 0.5 cents for each gallon in excess of 200 gallons per day.

(a) Draw the budget constraint for the Wilson family.

(b) Is the Wilson family (or any other family) likely to choose to consume exactly 200 gallons of water per day? Explain your answer.

7. At current rates of consumption, Pete obtains 5 extra jollies from eating another hamburger and 2 extra jollies from drinking another Pepsi. Hamburgers cost \$3 each and Pepsi costs \$1 per can.

(a) What is Pete's marginal rate of substitution of Pepsi for hamburgers?

(b) Is Pete in consumer equilibrium? Explain your answer.

(c) How should Pete adjust his consumption to attain consumer equilibrium?