Homework 6 (56 Points)

Part I: Multiple Choices (2 Points Each)

1. Which of the following statements is correct?

   (a) The demand for natural gas is more elastic over a short period of time than over a long period of time.

   (b) The demand for smoke alarms is more elastic than the demand for Persian rugs.

   (c) The demand for bourbon whiskey is more elastic than the demand for alcoholic beverages in general.

   (d) All of the above are correct.

2. When the price of a bracelet was $25 each, the jewelry shop sold 20 per month. When it raised the price to $35 each, it sold 14 per month. Assuming the demand curve didn't change during this time[1], the arc price elasticity of demand for bracelets is

   (a) 1.66.

   (b) 1.06.

   (c) 0.94.

   (d) 0.60.

[1] Why do we need to make this assumption?

3. Pierre says that he will spend exactly 10 dollars a day on coffee, regardless of the price of coffee. Pierre's demand for coffee is
   (a) perfectly elastic.
   (b) unit elastic.
   (c) perfectly inelastic.
   (d) None of the above answers is correct.
4. Last month, sellers of good Y took in \$100 in total revenue on sales of 50 units of good Y. This month sellers of good Y raised their price and took in \$120 in total revenue on sales of 40 units of good Y. At the same time, the price of good X stayed the same, but sales of good X increased from 20 units to 40 units. Suppose changes in the sales of X are driven by demand shifts as a result of changes in the price of Y[2], we can conclude that goods X and Y are
   (a) substitutes, and have a cross-price elasticity of 0.60.
   (b) complements, and have a cross-price elasticity of 0.60.
   (c) substitutes, and have a cross-price elasticity of 1.67.
   (d) complements, and have a cross-price elasticity of 1.67.

Part II: Problems

Problem 1 (4 Points)

Suppose the market for a good can be represented by the following equations of supply and demand:

$$\begin{aligned} \text{Supply:} \quad & P = 0.05 \times Q_S \\ \text{Demand} \quad & P = 20 - 0.15 \times Q_D \end{aligned}$$

, where Q_S and Q_D denote respectively quantity supplied and quantity demanded.

1. What are the equilibrium price quantity in this market? (2 Points)
2. What are the price elasticity of demand and the price elasticity of supply at this equilibrium? (2 Points)

[2] Why do we need to make this assumption?

Problem 2 (10 Points)

Fred spends his monthly paycheck going out to dinners and going to concerts. His income varies from month to month as does the price of dinners out and the price of concerts. The table below shows the data on number of times he has eaten out each month as well as his income in the month as well as the prices he faced during each month.

Month	Income	Dinner Price	Concert Price	Quantity of Dinners out
Apr	200	10	20	10
May	400	10	20	20
Jun	200	20	20	5
Jul	150	15	30	5

1. To calculate Fred's price elasticity of demand for dinners out, we should use the data for the months of _____ and _____ because the (income/dinner price/concert price) differs between these months but everything else is the same. Fred's arc price elasticity of demand for dinners out is _____. (4 Points)

2. To calculate Fred's income elasticity of demand for dinners out, we should use the data for the months of _____ and _____ because the (income/dinner price/concert price) differs between these months but everything else is the same. Fred's arc income elasticity of demand for dinners out is _____. (4 Points)

3. Dinners out are a (normal/inferior) good. (2 Points)

Problem 3 (12 Points)

Note. Solution to this problem requires `R` programming and should be written in `R Markdown`.

Suppose the demand for a good is

$$q = \frac{10000}{\sqrt{p}} \tag{1}$$

1. Plot this demand curve[3]. (2 Points)
2. What is the price elasticity of demand for this good? (2 Points)

In reality, the data we observe are often noisy. They may contain measurement error and unobserved variables. In the presence of measurement error, the relationship between observed prices and quantities can be represented by

$$q = \frac{10000}{\sqrt{p}} + \epsilon \tag{2}$$

, where ϵ is random noise. "`Demand_data.csv`" contains data generated from (2). Use the data to answer the following questions:

3. Draw a scatter plot of p and q. (2 Points)
4. Draw a scatter plot of $\log(p)$ vs. $\log(q)$ and add a linear best-fit line. (2 Points)
5. Find out the slope of the linear best-fit line by regressing $\log(q)$ on $\log(p)$. (2 Points)
6. How does your answer to question 5 compare with your answer to question 2? Why? (2 Points)

[3] For this question, draw p on the x−axis, q on the y–axis, and let p range from 100 to 1000.

Problem 4 (6 Points)

Read the article "How computer automation affects occupations: Technology, jobs, and skills"[4].

1. Briefly summarize the article. (2 Points)

2. Why does the author claim that "if a job is only partially automated, employment might actually increase"? According to the author, what determines whether automation will on net increase or decrease available jobs? If you can, use demand and supply diagrams to illustrate your point. (4 Points)

Problem 5 (4 Points)

Read the article "Taxi v Uber: A Tale of Two Cities".

1. In what sense can Taxi and Uber be complements and in what sense can they be substitutes? (2 Points)

2. According to the evidences presented in this article, has Uber been a complement or substitute to Taxi service in New York city? Why? (2 Points)

[4] You can read the research paper behind this article here.

Problem 6 (12 Points)

1. Read the article "The Effects of Uber's Surge Pricing: A Case Study".
2. Listen to the podcast: Why Uber is an Economists Dream[5].

Answer the following questions:

1. What is dynamic pricing? How does Uber use dynamic pricing ("surge prices") to match supply and demand? (2 Points)
2. According to the estimated demand elasticities, do Uber consumers have elastic or inelastic demand? (2 Points)
3. Are the estimated demand elasticities short-run or long-run elasticities? Why? (2 Points)
4. What is the total estimated consumer surplus created by Uber in the U.S.? (2 Points)
5. According to Levitt (host of the podcast), dynamic pricing increases welfare because it allows consumers who have the highest values for Uber service to get a ride when demand is high (i.e. the service is obtained by those who value it the most). Do you agree or disagree? (2 Points)
6. What are some of the limitations of dynamic pricing? Explain why consumers can be unhappy with some of its applications. (2 Points)

[5] You can read the research paper behind this article here.