Problem Set 2

Solutions

ECON 306 Fall 2022

Note: Answers may be longer than I would deem sufficient on an exam. Some might vary slightly based on points of interest, examples, or personal experience. These suggested answers are designed to give you both the answer and a short explanation of why it is the answer.

Concepts and Critical Thinking

1. **Describe, in your own words, the (i) price effect, (ii) real income effect, and (iii) substitution effect from a price change.**

The substitution effect is the change in consumption of a good due to a price change; the fact that a change in price causes consumers to substitute some of one good for another, specifically, they buy less of the good that has become relatively more expensive, and buy more of the good that has become relatively cheaper, and get the same utility. This is the classic cause of a downward sloping demand curve.

The "real" income effect is the change in consumption of a good due to a change in real purchasing power arising from a price change (now you can buy more goods in total because at least one good is cheaper). This may be positive or negative, depending on whether the good is a normal good (positive) or an inferior good (negative).

The price effect is the overall net effect, adding the income and substitution effects together to describe the change in consumption from a change in that good's price.

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2. **Under what conditions can the law of demand be violated (however theoretical)?**

A "Giffen good" violates the law of demand, that is, as price increases (decreases), the quantity demanded for the good also increases (decreases). The good must be (i) an inferior good (negative real income effect) and the (ii) real income effect must be larger than the substitution effect.

3. **For each of the following pairs, which of the two goods is more likely to have a *low* price elasticity of demand (less elastic) and why?**

a. **Demand for tangerines vs. demand for fruit**

Fruit is more inelastically demanded because the overall category of fruit has fewer good substitutes than any one item in that category.

b. **Demand for beef next month vs. demand for beef over the next decade**

More inelastic over the next month because people are usually less flexible in their buying behavior in the short run.

c. **Demand for Exxon gasoline at the corner of 7th and Grand vs. demand for gasoline in the entire city**

Brand-named goods are more elastic than categories especially when there are very good substitutes for Exxon gasoline available at close distances.

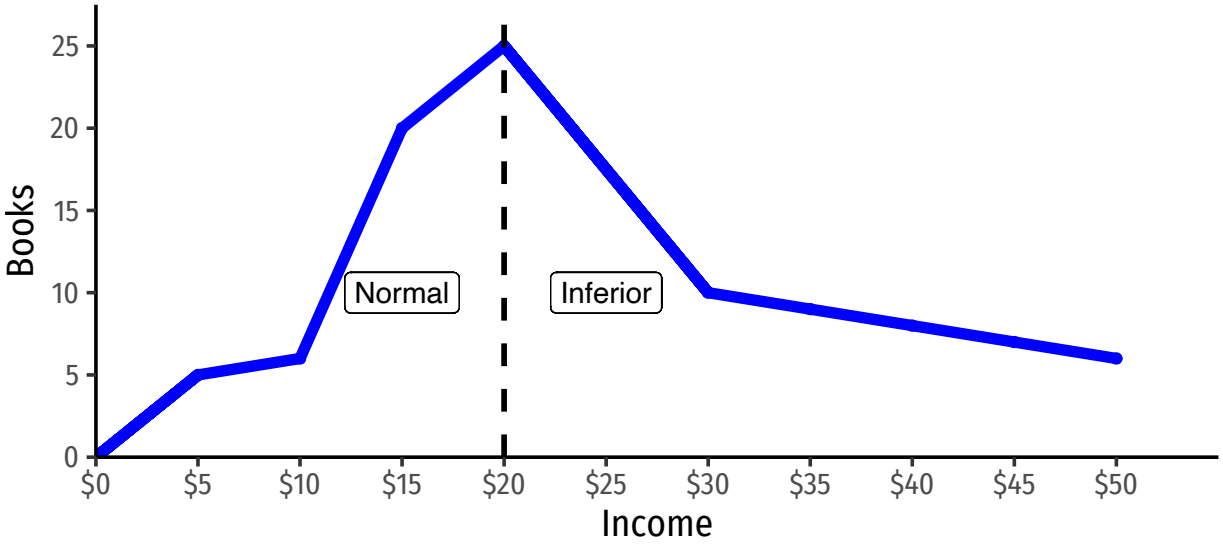
d. **Demand for insulin vs. demand for vitamins**

Insulin is probably more of a necessity; thus, demand for insulin from buyers is more inelastic than demand for vitamins for buyers of vitamins.

Income	Books
5	5
10	6
15	20
20	25
25	26
30	10
35	9
40	8
45	7
50	6

4. **Suppose that, holding prices constant, Alice has preferences over the number of books she purchases, illustrated in the table below.**

Draw a smooth approximation of Alice's Engel curve for books, indicating the ranges over which books are inferior goods and over which they are normal goods.



Below $20 of income, books are a normal good (the Engel curve slopes to the upwards, so as income increases, so does consumption), but above $20, books become an inferior good (the Engel curve slopes to downwards, so as income increases, so consumption decreases).

Note, you can swap the axes (Books on horizontal axis, Income on vertical axis) like the textbook does. Either way, you should obtain the same normal/inferior relationships at the same income ranges!

Quantitative Applications

Show all work for calculations. You may lose points, even if correct, for missing work. Be sure to label graphs fully, if appropriate.

5. **Steve spends his disposable income on meals at restaurants (r) and paperback novels (n). His usual restaurant meal costs $25, and paperback books cost $8. When Steve's monthly income is $240, he goes out to eat 8 times and purchases 5 books. When his income rises to $282, he goes out to eat 10 times and purchases 4 books.**

a. **Calculate the income elasticity for meals at restaurants (r). Is this an inferior, necessity, or luxury good?**

We need to examine the income elasticity of each good. Let's start with restaurant meals:

$$\begin{aligned}
\epsilon_{r,m} &= \frac{\frac{\Delta r}{r}}{\frac{\Delta m}{m}} \\
&= \frac{\frac{(10-8)}{8}}{\frac{(282-240)}{240}} \\
&= \frac{\frac{2}{8}}{\frac{42}{240}} \\
&= \frac{0.25}{0.175} \\
&\approx 1.43
\end{aligned}$$

Since the elasticity is positive, they are normal goods. Since the elasticity is larger than 1, they are luxury goods. For every 1% Steve's income increases (decreases), he buys 1.43% more (fewer) meals.

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b. **Calculate the income elasticity for paperback novels (n). Is this an inferior, necessity, or luxury good?**

$$\begin{aligned}
\epsilon_{n,m} &= \frac{\frac{\Delta n}{n}}{\frac{\Delta m}{m}} \\
&= \frac{\frac{(4-5)}{5}}{\frac{(282-240)}{240}} \\
&= \frac{\frac{-1}{5}}{\frac{42}{240}} \\
&= \frac{-0.20}{0.175} \\
&\approx -1.14
\end{aligned}$$

Since the elasticity is negative, they are inferior goods. For every 1% income increases (decreases), Steve buys 1.14% fewer (more) novels.

6. **Kendra buys eggs (e), bagels (b), and coffee (c) for breakfast for the week.**

a. **When eggs are $2/carton, she buys 5 bagels. When the price of eggs falls to $1/carton, she buys 4 bagels. Calculate the cross-price elasticity between eggs and bagels. Are they complements or substitutes for Kendra?**

$$\begin{aligned}
\epsilon_{b,p_e} &= \frac{\frac{\Delta b}{b}}{\frac{\Delta p_e}{p_e}} \\
&= \frac{\frac{(4-5)}{5}}{\frac{(1-2)}{2}} \\
&= \frac{\frac{-1}{5}}{\frac{-1}{2}} \\
&= \frac{0.2}{0.5} \\
&= 0.4
\end{aligned}$$

Since the cross-price elasticity is positive, they are substitutes. When the price of eggs increases (decreases) by 1%, she buys 0.4% more (fewer) bagels.

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b. **When eggs are $2/carton, she buys 3 cups of coffee. When the price of eggs falls to $1/carton, she buys 6 cups of coffee. Calculate the cross-price elasticity between eggs and coffee. Are they complements or substitutes for Kendra?**

$$\begin{aligned}
\epsilon_{c,p_e} &= \frac{\frac{\Delta c}{c}}{\frac{\Delta p_e}{p_e}} \\
&= \frac{\frac{(6-3)}{3}}{\frac{(1-2)}{2}} \\
&= \frac{\frac{3}{3}}{\frac{-1}{2}} \\
&= \frac{1}{-0.5} \\
&= -2
\end{aligned}$$

Since the cross-price elasticity is negative, they are complements. When the price of eggs increases (decreases) by 1%, she buys 2% fewer (more) cups of coffee.