

Department of Economics
Carleton University
ECON 2009A – Managerial Economics
Quiz #1 - September 27, 2018 (45 minutes)

1. (25 points) Suppose the monthly demand for meat is estimated to be

$$Q = 45,000 - 20p + 3p_X - 2p_Z + 0.05Y,$$

where Q is quantity of meat in kilos, p is the price per kilo of meat, p_X and p_Z are prices of products X and Z , and Y is the income per capita. Answer the following:

- (a) (5 points) What is the change in the quantity of meat demanded (in kilos) if the price of meat increases by \$1?

If the price of meat increases by \$1 the quantity will fall by 20 kilos. This is given by the coefficient in front of the price variable in the demand curve.

- (b) (10 points) Is product X a substitute or a complement of meat? Explain and provide an example of such a product.

Product X is a substitute for meat because the coefficient of p_X is 3, positive number. This means that as the price for X increases which will lead to a decrease in the quantity of X , the quantity of meat will increase. Consumers are switching away from X and towards meat as the price of X goes up. Substitutes for meat could be pork, chicken, fish, etc.

- (c) (10 points) Is product Z a substitute or a complement of meat? Explain and provide an example of such a product.

Product Z is a complement to meat because the coefficient of p_Z is negative: -2. As the price of Z increases which will lead to a decrease in the quantity of Z demanded, the quantity of meat will also decrease. Consumer switch away from both Z and meat as p_Z increases. Complements to meat could be potatoes, rice, mustard, etc.

2. (20 points) Briefly (one or two lines) explain if and how each of the events below affects the equilibrium price and quantity in the **market for winter boots**. Make sure to describe whether each event affects demand or supply and how.

- (a) An increase in the cost of leather
- (b) A drop in the price of waterproof fabric
- (c) A decrease in the average consumer income
- (d) An increase in the price of sneakers

- (a) An increase in the cost of leather shifts the supply curve to the left (decrease). Because an input in the production of winter boots is now more expensive, suppliers will be willing to sell fewer units at the same price (or the same number of units at a higher price). This will increase the equilibrium price and decrease the equilibrium quantity in the market for winter boots.
- (b) A drop in the price of waterproof fabric has the opposite effect as (a) because this is also an input into the production process but now its cost has dropped. The supply curve will shift to the right (increase) which will lead to a lower equilibrium price and higher equilibrium quantity.
- (c) A decrease in consumer income will shift the demand curve to the left (decrease) because now consumers will buy fewer winter boots. This will lead to a decrease in price and quantity in the market for winter boots.
- (d) Here you can argue that sneakers are either complements or substitutes of winter boots. As long as you specify this, your answer should be consistent. If sneakers are complements of winter boots, then an increase in the price of sneakers will lead to a decrease in the demand for winter boots. This will cause the equilibrium price and quantity of winter boots to fall. The opposite is true if you consider sneakers as substitutes.
3. (20 points) In each case below, identify the effect on the supply and/or demand in the **market for oranges**. Discuss also effects on the equilibrium price and quantity.
- (a) (5 points) A very bad winter in Florida creates a negative effect in the production of oranges. A bad winter will reduce the production of oranges, shifting the supply curve to the left. This will increase the equilibrium price and reduce the equilibrium quantity of oranges traded.
- (b) (5 points) The government introduces a successful advertising campaign promoting the nutritional benefits of oranges. A successful campaign would increase demand for oranges, shifting the demand curve to the right. This will increase the equilibrium price and the equilibrium quantity traded.
- (c) (10 points) Both (a) and (b) happening simultaneously.
- Effect on equilibrium price: Both a decrease in supply and an increase in demand will lead to an increase in the equilibrium price.
- Effect on equilibrium quantity: Because a decrease in supply leads to a drop in the equilibrium quantity, while an increase in demand leads to an increase in the equilibrium quantity traded, the final effect on quantity is uncertain. The equilibrium quantity will increase or decrease depending on whether the shift in demand or supply is larger.

4. (25 points) A hot dog food truck estimates that the inverse demand curve for its product is $P = 100 - Q$, where P is the price per hot dog and Q is the number of hot dogs sold.

- (a) (5 points) At what price and quantity will the price elasticity of demand be equal to -1?

Start with the definition of price elasticity of demand and replace the slope of the demand curve. You can then either replace P with the inverse demand and solve for Q or you can replace Q with the demand curve and solve for P . With the solution to either P or Q you go back to the demand or inverse demand to find the solution to the other. I will replace the demand below.

$$\begin{aligned}\eta &= \frac{\Delta Q}{\Delta P} \frac{P}{Q} \\ -1 &= -1 \frac{P}{(100 - P)} \\ 1 &= \frac{P}{(100 - P)} \\ 100 - P &= P \\ 100 &= 2P \rightarrow \boxed{P = 50}\end{aligned}$$

Replacing back in the demand we get that $Q = 50$ as well.

- (b) (10 points) What is the range of prices for which this demand is inelastic?

There are at least two ways of answering this question. One is to note that demand is inelastic when the elasticity is larger than -1 (or smaller than 1 in absolute value, i.e. between -1 and 0). Because we already found the price for which the elasticity is -1 and we can say that demand becomes more inelastic as price falls – see the equation for demand elasticity above, then demand is inelastic for all prices below 50.

Alternatively, you can also solve this mathematically as above but using the inequality sign as opposed to the equality:

$$\begin{aligned}\eta &= \frac{\Delta Q}{\Delta P} \frac{P}{Q} \\ -1 &< -1 \frac{P}{(100 - P)} \\ 1 &> \frac{P}{(100 - P)} \quad (\text{inequality is reversed because I multiplied by } -1) \\ 100 - P &> P \\ 100 &> 2P \rightarrow \boxed{P < 50}\end{aligned}$$

- (c) (10 points) What will happen to total revenue if the price increases from \$5 to \$7? (Note: you

will receive full points only if you relate your answer to the price elasticity of demand)

Prices of \$5 and \$7 are on the inelastic portion of the demand curve (as we found above). This means that any price increase in this range will lead to an increase in revenue because an inelastic demand means that the decrease in quantity is less than proportional to the increase in price.

You can also just calculate the change in revenue but that will not give you full points:

- When $P = \$5$, $Q = 100 - P = 95$, so $TR = P \times Q = \$475$
- When $P = \$7$, $Q = 100 - P = 93$, so $TR = P \times Q = \$651$
- Change in revenue $\Delta TR = \$651 - \$475 = \$176$

5. (10 points) Two managers are discussing ways of increasing the firm's economic profit for the next year. The firm is currently renting the office space it occupies and one of the managers is suggesting that the firm should buy the office space so it can eliminate the monthly rent payments from next year's costs. Do you agree that this suggestion will increase the firm's economic profit? Why or why not?

Whether the company owns or not the office space, the opportunity cost does not change: it is always the value of the best alternative use. In the case of an office space that is the rent that you could collect for it. So ownership or not of the office space does not change the economic profit of the firm.