EC155a Fall 2017

Problem set #2 - ANSWERS

Question 1

a) Why is the supply curve upward sloping?

Because (marginal) costs increase for firms as they produce more of a good, they need to be compensated more in order to supply more of the good.

b) Imagine that two goods, A and B, are complements. Is their cross-price elasticity positive or negative? If the price of good B goes up, show the shift in demand for good A, *if any*

When two goods are complements, the quantity demanded for one will decrease when the price of the other goes up. So when the price of hot dogs goes up, the quantity demanded for hotdogs goes down (the law of demand), which reduces the quantity demanded for mustard (at any given price). So the cross-price elasticity will be negative, which one would illustrate with an inward shift of the demand curve for good A (mustard) as the price of good B (hot dogs) goes up.

c) If a state raise its minimum wage, what is the likely outcome? Is raising the minimum wage a good idea or a bad idea? Justify your answer.

Discuss what we learned from the FiveThirtyEight article. A good answer will discuss (as Mankiw did) that a minimum wage will have a larger effect in the long run than the short run because of the difference between long-run and short-run elasticities.

d) If the state of California taxes sugared drinks, what will happen to the consumer price for these drinks and the equilibrium quantity consumed? Who do you think will 'bear the burden' of this tax? Is such a tax a good idea? Justify your answers.

The price will go up and the equilibrium quantity will be reduced. If demand for sugared drinks is relatively inelastic (pretty likely, as they are an 'aggregate category' and their are no easy substitutes) consumers would bear the burden of the tax. You could make the case that producers would if you tell a different, <u>convincing</u> story about elasticities.

Question 2

a. On a Saturday night, Juan says that he will spend \$20 on pizza, no matter what the price per slice. Cheryl says she will buy three slices, no matter what the price per slice. What is Juan's elasticity of demand for pizza slices? What is Cheryl's elasticity of demand for pizza slices? Justify and illustrate your answers.

Cheryl's demand is inelastic: perfectly verticals ad Q = 3. Juan's is unitary (Ed = 1), because the expenditure never changes ($P^*Q = 20 , no matter what.) This would then be a convex demand curve, where the ordered pairs include (20,1), (10,2), (5,4), (4,5), (2,10), and (1,20).

b. When the price of a good is raised from \$90 to \$110, the quantity demanded of the good declines by 5%. If the producer of this good wants to increase revenues, should she raise prices, lower prices, or do nothing - or is it not certain?

Using the midpoint method, the percentage change of the price is (110 - 90)/([90 + 110]/2) = 20/100 = 20%, so that the elasticity of demand = 5%/20% = 0.25. With inelastic demand, the producer should increase prices, as the change in quantity is relatively less than the change in price, which means revenues (p*q) will go up.

c. Imagine that demand and supply for a good are neither perfectly elastic not perfectly inelastic. Before the imposition of a tax, the equilibrium price for the good is \$10.00. After the imposition of a \$2.00 per unit tax, will the new equilibrium price for consumers be greater than, equal to, or less than \$12.00 - or is it not certain?

It will be less than \$12, as the price wedge will induce movement up the demand curve but also down the supply curve, so that the new equilibrium price for consumers will be less than \$12. (See any graph in the Mankiw chapter on taxes to illustrate this.)

d. Under what conditions will a tax on gasoline dramatically reduce the consumption of gasoline? Explain and illustrate graphically.

A tax on gasoline will dramatically reduce the the consumption of gasoline

when demand and supply are relatively elastic, so that the tax wedge will induce a large movement away from the pre-tax equilibrium. A diagram would show relatively flat (e.g., not much of a slope) demand and suppy curves.

Question 3

True or false questions: in all cases, justify your answers.

a. An increase in the price of a product will always lead to a reduction in total spending for that product.

False. See the discussion about elasticities and revenues.

b. The demand for Samsung smartphones is likely to be more inelastic than the demand for all smartphones.

False. Samsung has substitutes (iPhone); smartphones have few substitutes.

c. If the government imposes regulations on electric refrigerators that dramatically increased their efficiency, demand for electricity will always shift in.

Probably, but not always. If the dramatic increase of efficiency freed up enough money for consumers, an "income effect" could arise such that they spend a large share of their new-found money on other electrical services.

Question 4

Production and consumption of maple syrup - a delicious sweetener that comes from the sap of maple trees - are very common in Vermont. It is produced in the early spring ("mud season") from full grown trees and consumed year-round.

Imagine that the demand and supply for pints of syrup among three suppliers and three consumers are as follows:

\$10	35	30	40	105
\$20	30	25	35	90
\$30	20	15	25	60
\$40	15	15	20	50
\$50	10	10	20	40
\$60	5	5	10	20
\$70	0	0	5	5
\$80	0	0	0	0
			Producer Z	
	Producer X	Producer Y	Proc	lucer Z
\$10	Producer X 0	Producer Y 0	Proc 0	lucer∠ 0
\$10 \$20	Producer X 0 0	Producer Y 0 0	Proc 0 5	lucer∠ 0 5
\$10 \$20 \$30	Producer X 0 0 5	Producer Y 0 0 0	Proc 0 5 10	lucer∠ 0 5 15
\$10 \$20 \$30 \$40	Producer X 0 0 5 10	Producer Y 0 0 0 5	Proc 0 5 10 15	0 5 15 30
\$10 \$20 \$30 \$40 \$50	Producer X 0 0 5 10 10	Producer Y 0 0 5 10	Proc 0 5 10 15 20	0 5 15 30 40
\$10 \$20 \$30 \$40 \$50 \$60	Producer X 0 5 10 10 15	Producer Y 0 0 5 10 15	Proc 0 5 10 15 20 25	0 5 15 30 40 55
\$10 \$20 \$30 \$40 \$50 \$60 \$70	Producer X 0 0 5 10 10 15 20	Producer Y 0 0 5 10 15 20	Proc 0 5 10 15 20 25 30	0 5 15 30 40 55 70

a) Based on these data, what is the market demand schedule for maple syrup? What is the market supply schedule?

See the data above

b) What is the elasticity of market demand in the range between \$20 and \$30? What is the elasticity of market supply in the range between \$20 and \$30? Is demand in this range elastic or inelastic? What is the sign of the elasticity of supply?

Demand: [(90 - 60)/average(90, 60)]/[(20-30]/average(20.30)] = (30/75)/(-10/25) = (2/5)/(-2/5) = -1 → absolute value = 1. So this is unitary elasticity.

Supply: [(5 - 15)/average(5, 15)]/[(20-30]/average(20.30)] = -(10/10)/(-2/5) = 2.5.The elasticity of supply is positive.

c) In January 2014, researchers at the Proctor Maple Research Center at the University of Vermont announced the discovery of a new technique that extracts the sap out of maple saplings. The new technique "would allow more maple

syrup to be produced on less land." Using a graphical model, show how this discovery is likely to affect the supply of maple syrup. How is the price of maple syrup likely to change in the short-run *and* the long-run as a result of this new technique? Is this change likely to increase revenues for producers? Justify your answers.

A technological change would shift out supply, thereby lowering the price (and increase the equilibrium quantity). In the long run - with more elastic demand and supply - the price change is likely to be less.

Question 5

Imagine that you are an economic advisor to Vermont Governor Phil Scott. He tasks you with following challenge:

- Design a consumption tax on <u>one item of food</u> to raise \$10,000,000 in revenue.
- Make sure that the tax does not disproportionately hurt lower income nor older people.

As you are considering options for this tax, what kind of data would you need to collect to decide what food product to tax? How would those data help you to design the tax? Justify your answers, and use a graphic model to illustrate your answer.

A good answer will make the case for a good that has inelastic demand among the more wealthy (and younger folks), so that upper income and younger folks will continue to purchase it even after the price goes up. (Alternatively, demand could be elastic for such folks but if the good is so popular a large change in demand could still produce \$10,000,000 in tax revenues.)