Homework 2 Solutions

ECON 101

Summer I 2016

Name:		
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PID:		

This homework is due on May 23 by 1PM. Show work for all questions that require it (including multiple choice questions), attaching extra sheets as necessary. Multiple choice answers should be bubbled in on a scantron. For the short answer section, write legibly and make sure to box final answers. The total number of points available on this assignment is 100.

Multiple Choice [2 pts each]

- 1. The ability of firms to enter and exit a market over time means that, in the long run,
 - (a) the demand curve is more elastic.
 - (b) the supply curve is more elastic.
 - (c) the demand curve is less elastic.
 - (d) the supply curve is less elastic.

Solution: See class notes.

- 2. Suppose we are studying the market for Jello and news came out that eating Jello is detrimental to one's health. Given this, we can say that we could
 - (a) calculate both the price elasticity of demand for Jello and the price elasticity of supply.
 - (b) calculate the price elasticity of supply for Jello, but not the price elasticity of demand.
 - (c) calculate the price elasticity of demand for Jello, but not the price elasticity of supply.
 - (d) not calculate either the price elasticity of demand for Jello or the price elasticity of supply.

Solution: To calculate elasticity of demand or supply, we need two points along a given demand or supply curve, respectively. Here, the demand curve shifts, so we cannot calculate the elasticity of demand. However, we will have two points on a stationary supply curve so we can calculate the elasticity of supply.

- 3. Suppose that the price of cotton increases. In the market for oversized t-shirts, the total revenue received by sellers will _______if the ______.
 - (a) increase; demand curve is inelastic
 - (b) decrease; supply curve is inelastic
 - (c) increase; demand curve is elastic
 - (d) increase; supply curve is elastic

Solution: An increase in the price of an input will lead to a decrease in supply, which will increase the equilibrium price of oversized t-shirts. If the price increases, then TR will increase if demand is inelastic or decrease if demand is elastic.

- 4. The minimum wage in Los Angeles was recently increased from \$9/hour to \$15/hour. This increase in the minimum wage will cause employment to fall by 10% if _____and results in a(n) _____in total wage payments.
 - (a) labor supply is inelastic; increase
 - (b) labor demand is inelastic; increase
 - (c) labor demand is elastic; decrease
 - (d) labor supply is elastic; decrease

Solution: An increase in the minimum wage leads to movement along the labor demand curve to determine Q_E . $\%\Delta W = \frac{15-9}{(15+9)/2} \times 100\% = 50\%$. $\Rightarrow |\mathcal{E}_D^W| = \frac{10\%}{50\%} = .2$ Labor demand is inelastic, so an increase in wages leads to an increase in total wage payments.

- 5. Suppose the price of beans rises from \$10 to \$12. As a result, the quantity demanded of porridge falls by 10%. What is the cross-price elasticity between the two goods?
 - (a) 1.818
 - (b) -1.818
 - (c) .55
 - (d) -.55

Solution: $\varepsilon_{dy}^{P_x} = \frac{\%\Delta Q_{dy}}{\%\Delta P_x}$. We are given $\%\Delta Q_{dy} = -10\%$. $\%\Delta P_x = \frac{P_1 - P_0}{(\frac{P_0 + P_1}{2})} \times 100\% = \frac{12 - 10}{(\frac{10 + 12}{2})} \times 100\% = 18.18\%$. So, $\varepsilon_{dy}^{P_x} = -10\% \div 18.18\% = -.55$.

- 6. For which pairs of goods is the cross-price elasticity most likely to be negative?
 - (a) pens and pencils
 - (b) car tires and coffee

- (c) peanut butter and jelly
- (d) new textbooks and used textbooks

Solution: Cross-price elasticity is negative for goods that are complements. PB & J are the only complements from the answer choices.

- 7. If the absolute value of the price elasticity of demand is .5, then when the price of good X rises by 20%
 - (a) the quantity demanded of good X rises by 40%.
 - (b) the quantity demanded of good X rises by 10%.
 - (c) the quantity demanded of good X falls by 10%.
 - (d) the quantity demanded of good X falls by 40%.

Solution: $|\varepsilon_d^P| = |\frac{\%\Delta Q_d}{\%\Delta P}| = |\frac{\%\Delta Q_d}{+20\%}| = .5 \Rightarrow |\%\Delta Q_d| = 10\%$. By Law of Demand, if prices increased, then quantity demanded must have fallen so $\%\Delta Q_d = -10\%$.

- 8. If the price elasticity of supply is .8, and prices increased by 5%, then quantity supplied would
 - (a) increase by 4%.
 - (b) decrease by 4%.
 - (c) increase by 6.25%.
 - (d) decrease by 6.25%.

Solution:
$$\varepsilon_s^P = \frac{\%\Delta Q_s}{\%\Delta P} = \frac{\%\Delta Q_s}{+5\%} = .8 \Rightarrow \%\Delta Q_s = +4\%.$$

- 9. In a market with a binding price ceiling, an increase in the ceiling will ______the quantity supplied, _____, the quantity demanded, and reduce the _____.
 - (a) increase; decrease; surplus
 - (b) decrease; increase; surplus
 - (c) increase; decrease; shortage
 - (d) decrease; increase; shortage

Solution: An increase in the price ceiling will raise the market price closer to the free market equilibrium price. Q_s would increase and Q_d would decrease, which will reduce the shortage caused by the binding price ceiling.

- 10. Marianne pays Natalie \$50 to mow her lawn every week. When the government levies a mowing tax of \$10 on Natalie, she raises her price to \$60. Marianne continues to hire her at the higher price. What is the change in producer surplus, consumer surplus, and deadweight loss?
 - (a) \$0,\$0,\$10
 - (b) \$0, -\$10, \$0
 - (c) +\$10, -\$10, +\$10
 - (d) +\$10, -\$10, \$0

Solution: With the tax, Natalie raises her price to \$60, but only receives \$50 since \$10 is going to the government. Marianne pays the new higher price of \$60 and thus bears the entire burden of the tax. For Marianne, her $CS = WTP - P_B$, and since the price she faces increased by \$10 her CS decreases by that amount. For Natalie, her $PS = P_S$ - seller cost. Since she still receives \$50, her surplus is unaffected. Finally, TS is unaffected as well because the loss in surplus to Marianne is offset by the increase in revenue the government receives from the tax.

- - (a) sellers; \$.75
 - (b) buyers; \$.90
 - (c) sellers; \$.90
 - (d) buyers; \$.75

Solution: Tax = $\$.50 = P_B - P_S \Rightarrow P_S = \$1.25 - \$.5 = \$.75$. Eq. price before tax = $P_S + \$.15 = \$.90$. Sellers pay \$.15 of the tax, buyers pay \$.35.

12. Consider Figure 1.

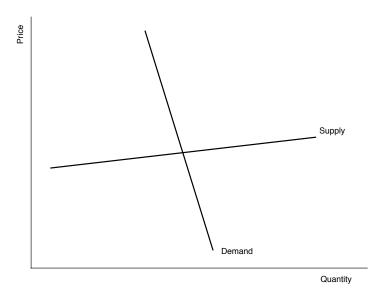


Figure 1: Market for Coke

If the government imposes a \$5 per unit tax on sellers in this market,

- (a) the burden of the tax will be split evenly between buyers and sellers in the market.
- (b) the burden of the tax will be greater for sellers than for buyers in the market.
- (c) the burden of the tax will be greater for buyers than for sellers in the market.
- (d) the split of the tax burden cannot be determined from this information.

Solution: Regardless of who the tax is levied against, the majority of the tax burden will fall on whoever has the more inelastic curve. From the graph, we see that demand is more inelastic and so buyers will bear a greater burden of the tax.

Refer to Figure 2 for questions 13 and 14.

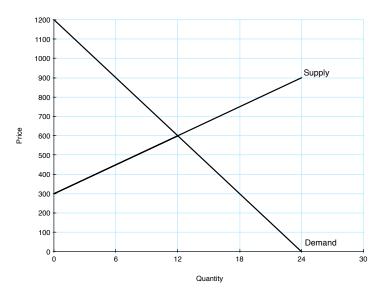


Figure 2: Market for Surface Tablets

13. If the government imposes a price floor of \$900, then consumer surplus would ______b

- (a) increase; \$900
- (b) decrease; \$2700
- (c) increase; \$2700
- (d) decrease; \$900

Solution: CS before the price floor is imposed is given area between the demand curve and $P^* = 600$ up to $Q^* = 12$. $CS_0 = 1/2 \cdot (600) \cdot (12) = \$3,600$. CS after the price floor is imposed is given by area between the demand curve and $P_F = \$900$ up to new quantity $Q_F = 6$. $CS_1 = 1/2 \cdot (300) \cdot (6) = \900 . CS decreased by \$2,700.

14. As a result of this price floor, the total revenue earned by firms ______because

- (a) increased; supply is inelastic
- (b) decreased; demand is inelastic
- (c) increased; demand is inelastic
- (d) decreased; demand is elastic

Solution: $TR_0 = P^* \times Q^* = \$600 \times 12 = \$7,200$. $TR_1 = P_F \times Q_F = \$900 \times 6 = \$5,400$. TR decreased, so it must be that demand is elastic between these points.

15. A tax of \$4 is imposed by the government. Use Table 1 to answer the question below.

Table 1: Unit Taxes

	Price with no tax	Price with \$4/unit tax on sellers
Price paid by buyers	\$55	?
Price received by sellers	\$55	\$53.50

Because of this tax, buyers are paying _____ per unit and sellers are receiving _____ per unit.

- (a) \$4 less; \$4 more
- (b) \$2 more; \$2 less
- (c) \$2.50 more; \$1.50 less
- (d) \$4 more; \$4 less

Solution: Sellers receive \$55 - \$53.50 = \$1.50 less per unit. $P_B = P_S + \tan = $53.50 + $4 = $57.50 \Rightarrow$ buyers paying \$57.50 - \$55 = \$2.50 more than before.

- 16. David's cat causes Carlos to sneeze. David values his cat's companionship at \$400 a year. Carlos has to pay for tissues and allergy medication due to the cat that cost him \$500 a year. According to the Coase Theorem,
 - (a) David should pay Carlos \$400 so he may keep his cat.
 - (b) David should pay Carlos \$500 for his tissues and medication.
 - (c) Carlos should pay David \$410 to give away his cat.
 - (d) None of the above.

Solution: David is willing to pay up to \$400 to Carlos to keep his cat, or he must receive more than \$400 in order to give his cat away. Carlos is willing to pay up to \$500 to David to get rid of the cat, or he must receive at least \$500 to be okay with it. Option C is the only one that works for both parties.

- 17. If the production of a good yields a positive externality, then the social benefit curve lies ______the demand curve, and the socially optimal quantity is ______the market equilibrium quantity.
 - (a) above; greater
 - (b) above; less
 - (c) below; greater
 - (d) below; less

Solution: See class notes.

- 18. The market equilibrium is not efficient when the consumption of a good creates external costs, which cause social costs to be
 - (a) less than the private cost.
 - (b) greater than the private cost.
 - (c) less than the total cost.
 - (d) greater than the total cost.

Solution: Social cost = private cost + external cost.

- 19. In the absence of intervention, negative externalities lead markets to produce
 - (a) efficient output levels, and positive externalities lead markets to produce greater than efficient output levels.
 - (b) smaller than efficient output levels, and positive externalities lead markets to produce greater than efficient output levels.
 - (c) greater than efficient output levels, and positive externalities lead markets to produce smaller than efficient output levels.
 - (d) greater than efficient output levels, and positive externalities lead markets to produce efficient output levels.

Solution: See class notes.

- 20. In order to eliminate the deadweight losses associated with a negative market externality, the government should impose a per unit tax ______.
 - (a) equal to the total external cost
 - (b) less than the total external cost
 - (c) greater than the per unit external cost.
 - (d) equal to the per unit external cost.
 - (e) None of the above.

Solution: See class notes.

- 21. Which of following is an example of a common resource?
 - (a) Residential housing
 - (b) National defense
 - (c) Restaurant meals
 - (d) Fish in the ocean

Solution: Common resources are non-excludable and rival. Housing and meals are rival and excludable. National defense in non-excludable and non-rival.

22. A neighborhood street is considering purchasing and installing doggy clean up stations in order to keep their lawns clean. Table 2 shows the willingness to pay of each family for each additional station.

Table 2: Willingness to Pay for Doggy Stations

Stations	Weiners Family	George Family	Heron Family
1st station	\$500	\$600	\$400
2nd station	400	450	300
3rd station	300	350	150
4th station	150	200	50
5th station	100	150	0

If each doggy station costs \$500, how many stations should the street install in order to maximize total surplus?

- (a) 2 stations
- (b) 0 stations
- (c) 3 stations
- (d) 1 stations
- (e) > 3 stations

Solution: See example from class notes. Should build the station as long as the total WTP \geq price/station.

- 23. Public goods are
 - (a) efficiently provided by market forces.
 - (b) underprovided in the absence of government.
 - (c) overused in the absence of government.
 - (d) a type of natural monopoly.

Solution: See class notes.

- 24. Which of the following examples demonstrates the free rider problem?
 - (a) Josh downloads the podcast Serial, but never contributes to NPR, its producer.
 - (b) Liz Lemon is upset that she and Jack Donaghy pay the same amount at the toll booth, even though she only uses the road for 5 miles, while he uses it for 25 miles.
 - (c) Due to a lack of clearly defined property rights, ocean creatures tend to be overfished.
 - (d) Kristina, Jane, and Andrea rent three movies and enforce that the costs are split evenly, even though Jane is only willing to pay her share for two movies.

Solution: Free riders enjoy benefits without having to pay. In (b) Liz and Jack pay, (c) demonstrates issues with common resources, and (d) illustrates a forced rider.

- 25. AJ opens a lemonade stand for two hours. He spends \$10 for ingredients and sells \$60 worth of lemonade. In those same two hours, he could have cleaned his neighbor's pool for \$40. AJ has an accounting profit of ______ and an economic profit of ______.
 - (a) \$50; \$10
 - (b) \$90; \$50
 - (c) \$10; \$50
 - (d) \$50; \$90

Solution: Total revenue = \$60. Explicit costs = \$10. Implicit costs = \$40. Accounting profit = TR - explicit costs = \$50. Economic profit = TR - (explicit costs + implicit costs) = \$10.

- 26. A firm is producing 100 units with an average total cost of \$25 and a marginal cost of \$15. If it were to increase production to 101 units, which of the following must occur?
 - (a) Marginal cost would decrease.
 - (b) Marginal cost would increase.
 - (c) Average total cost would decrease.
 - (d) Average total cost would increase.

Solution: If MC < ATC, then it must be that ATC are decreasing.

- 27. Bluth's Bananas currently employs 5 workers and produces 1,000 frozen bananas a day. In preparation for the busy summer season, the firm is debating whether they should hire 5 more workers. If they do, they project they could produce 1,500 frozen bananas a day. Given this, the marginal product of labor per worker from these additional workers would be
 - (a) 1,500.
 - (b) 500.
 - (c) 150.
 - (d) 100.

Solution: $MP_L = \frac{\Delta Q}{\Delta L} = \frac{(1,500-1,000)}{5} = 100.$

- 28. Shell Tires has fixed costs of \$300,000 per year. Last year, it produced 10,000 tires with an average variable cost of \$80. What were the firm's average total costs for last year?
 - (a) \$80
 - (b) \$90
 - (c) \$100
 - (d) \$110

Solution: ATC = TC/Q = (FC + VC)/Q = AFC + AVC = \$300,000/10,000 + \$80 = \$110.

29. Keystone Fireworks has fixed costs of \$100 and the marginal costs outlined in Table 3.

Table 3: Marginal Costs for Keystone

Quantity	Marginal Cost	Variable Costs
1	\$2	\$2
2	\$4	\$6
3	\$6	\$12
4	\$8	\$20
5	\$10	\$30
6	\$12	\$42

What is the average variable cost of producing the fifth unit?

- (a) \$2
- (b) \$6
- (c) \$10
- (d) \$30

Solution: At Q=0, VC = \$0. At Q=1, MC = \$2 which means VC increased by \$2 when going from Q=0 to Q=1. So, at Q=1, VC = \$2. At Q=2, MC = \$4, so VC increased by \$4 when going from Q=1 to Q=2. Since VC=\$2 at Q=1, at Q=2 VC = \$6. Continuing this process until Q=5, we have that VC = \$30. AVC = VC/Q = \$30/5 = \$6.

- 30. A firm currently produces 1,000 units of output with an average variable cost of \$5.10. The firm has fixed costs of \$5,000. If the firm were to produce 1,001 units, its total variable costs would be \$5,400. What is the marginal cost to the firm of producing 1,001 units?
 - (a) \$5,400
 - (b) \$300
 - (c) \$5,100
 - (d) \$400

At 1,000 units, $VC = 1,000 \times 5.10 = \$5,100$. $MC = \frac{\Delta VC}{\Delta Q} = \frac{(5,400-5,100)}{1} = \300 .

Short Answer

- 1. Consider public policy aimed at smoking.
 - (a) Studies indicate the price elasticity of demand for cigarettes is about 0.4. If a pack of [4 pts] smokes currently costs \$2 and the government wants to reduce smoking by 20%, by how much should it increase the price (in percentage terms)?

Solution: $\varepsilon_d^P = \frac{\%\Delta Q_d}{\%\Delta P} = -.4 \Rightarrow \frac{-20\%}{\%\Delta P} = -.4 \Rightarrow \%\Delta P = +50\%$. The government should increase cigarette prices by 50%. You can also use the elasticity formula to show that the new price should be \$3.33.

(b) If the government permanently increases the price of cigarettes, will the policy have a larger [4 pts] effect on smoking one year from now or five years from now? Draw a graph to support your answer.

Solution: See Figure 3. Demand in the short run is inelastic, and thus the quantity demanded will not decrease much due to the higher price. In the long run, demand becomes more elastic and thus the quantity demanded will fall more.

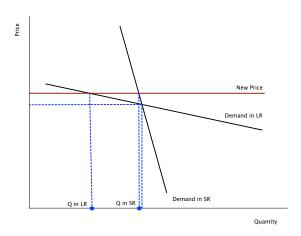


Figure 3: Demand for Cigarettes in SR and LR

(c) Studies also find that teens have a higher price elasticity of demand than do adults. Why [2 pts] might this be true?

Solution: One of the determinants price elasticity of demand is whether a good is viewed as a luxury or a necessity. Adult smokers likely view cigarettes as more of a necessity than teens since they have been smoking for a longer amount of time and thus likely find it harder to quit. Therefore, the price elasticity of demand is likely higher for teens. Additionally, cigarettes likely consume a greater amount of the budget for teens than adults, and again this implies teens have a more elastic demand.

- 2. Let's return to our study of the minimum wage.
 - (a) Suppose the minimum wage is above the market equilibrium wage in the market for unskilled labor. Draw a supply-and-demand diagram showing the market wage, the number of workers that are employed, and the number of workers who are unemployed. Also show the total wage payments to unskilled workers. **Hint:** We did this in class.

Solution: See Figure 4.

(b) What would be the effect of an increase in the minimum wage on employment? Does [4 pts] this change depend on the elasticity of demand, supply, both, or neither? Use a graph to support your answer.

Solution: An increase in the minimum wage will lead to a decrease in the quantity of workers employed $(Q_{E1} \to Q_{E2})$ in the graph). This quantity depends on the elasticity of demand, as both points are on the demand curve.

(c) What would be the effect of an increase in the minimum wage on unemployment? Does [4 pts] this change depend on the elasticity of demand, supply, both, or neither? Use a graph to support your answer.

Solution: An increase in the minimum wage will lead to an increase in unemployment (unemployment $1 \to \text{unemployment } 2$ in the graph), as the quantity demanded decreases and quantity supplied increases. The change depends on the elasticity of both demand and supply.

(d) Now consider the effect of an increase in the minimum wage on wage payments. What would [2 pts] happen to total wage payments if the demand for unskilled labor was inelastic? How does the elasticity of labor supply impact wage payments? Hint: Total wage payments are equivalent to the notion of total revenue in other markets we have studied.

Solution: With inelastic labor demand, total wage payments will increase with an increase in wages, as the increase in wages offsets the decrease in the number of workers employed. The elasticity of labor supply has no effect on Q_E , and so has no effect on total wage payments.

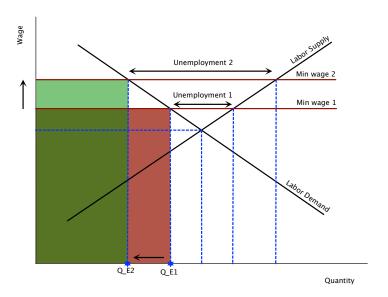


Figure 4: Labor Market with Minimum Wage

3. The many identical residents of Salisbury love drinking Cheerwine. Each resident has a certain willingness to pay for each can they consume as shown in Table 4.

Table 4: WTP for Cheerwine

Can	WTP
1st can	\$5
2nd can	\$4
3rd can	\$3
4th can	\$2
5th can	\$1
$>5~{ m cans}$	\$0

(a) The cost of producing Cheerwine is \$1.50. The competitive suppliers sell at this price and [4 pts]

have a perfectly elastic supply curve. How many cans will each person consume? What is the total surplus per person in this market?

Solution: Consumers purchase Cheerwine as long as their WTP $\geq \$1.50 \Rightarrow Q_D = 4/\text{person}$. PS = \\$0 if supply is perfectly elastic, so TS = CS = WTP - P for each can purchased \Rightarrow TS = (\\$5 - 1.50) + (\\$4 - 1.50) + (\\$3 - 1.50) + (\\$2 - 1.50) = \\$8/person.

(b) Producing Cheerwine creates pollution. Each can has an external cost of \$1. Taking this [4 pts] additional cost into account, what is the total surplus per person?

Solution: Each can consumed has an external cost of \$1. If each citizen buys four cans, the total external cost/person = $1/can \times 4 cans/person = 4/person$. TS/person = \$8 - \$4 = \$4.

(c) Mayor Woodson imposes a \$1 tax on Cheerwine. What is the consumption per person now? [4 pts] Calculate consumer surplus, the external cost, government revenue, and total surplus per person.

Solution: Since supply is perfectly elastic, the entire burden of the tax will be borne by consumers, so the new price consumers pay is 1.50 + 1 = 2.50. Consumers will each only buy 3 cans of Cheerwine now and

$$TS/person = \underbrace{(\$5 - 2.50) + (\$4 - 2.50) + (\$3 - 2.50)}_{Consumer \ surplus/person} - \underbrace{\$1 \times 3}_{TEC/person} + \underbrace{\$1 \times 3}_{Tax \ revenue} = \$4.50.$$

By internalizing the externality, we got rid of the DWL and increased TS.

4. Your roommate's food truck sells delicious burritos every Friday night. He tells you a story that as he closed up shop last weekend, an inebriated patron yelled at him to make him one for \$10.00. Your roommate had already sold 200 burritos that night, but usually has to sell them for \$4.00 due to market conditions. He tells you that he obviously sold him the burrito for \$10.00. If he faces the cost schedule detailed in Table 5, was this the right decision? Explain why or why not.

Table 5: Burrito Costs

Quantity	ATC
199	\$1.99
200	\$2.00
201	\$2.05

Solution: Your roommate should sell the burrito as long as $MR \ge MC$. MR = \$4. At Q=200, $TC = \$2.00 \times 200 = \400 and at Q=201 $TC = \$2.05 \times 201 = \412.05 . MC = 412.05 - 400 = \$12.05. Your friend should not have the sold burrito for \$10, as he would actually decrease his profit for the day by \$2.05.

5. What topics or questions gave you the most trouble on this homework assignment or the class material it encompassed?