

Exam 1

Solutions

ECON 101

Summer I 2016

Name: _____

ONYEN: _____

PID: _____

Honor Code Signature: _____

This exam consists of 30 multiple choice questions and 2 short answer questions. Multiple choice questions should be bubbled in on a scantron. Extra paper for scratch work is attached. The total number of points available on this exam is **100**.

Multiple Choice [2.5 pts each]

Choose the option that best answers the question given.

1. You are debating on what to do after this exam. You could go watch a baseball game, where tickets cost \$20 a person. You could instead go watch a movie, where tickets sell for \$10. After stressful exams, you find movies very relaxing and would pay up to \$15 to see this film. Assume there are no other costs to either activity. Based on this, what is your opportunity cost of watching a baseball game this afternoon?
 - (a) \$30
 - (b) \$25
 - (c) \$20
 - (d) \$35
 - (e) None of the above.

Solution: $OC = \text{cost of baseball game} + (\text{value of movie} - \text{cost of movie}) = \25 .

2. A firm sells 25 units at a price of \$10. Calculate its marginal revenue per unit of output if it sells 5 more units of output when it reduces its price to \$9.
 - (a) \$4
 - (b) \$2.50

- (c) \$20
(d) \$270

Solution: $TR_0 = 25 \times 10 = \$250$. $TR_1 = \$9 \times 30 = \270 . $MR = (270 - 250)/5 = \$4$.

3. Consider the simultaneous move game between Key and Peele shown below, where the first number in each block is the payoff to Key and the second is the payoff to Peele.

		Peele	
		Left	Right
Key	Top	6, 4	x , 2
	Bottom	1, 3	5, y

If “Top” is the dominant strategy for Key and “Left” is the dominant strategy for Peele, then possible values of x and y are

- (a) $x = 4$ and $y = 2$.
(b) $x = 6$ and $y = 2$.
(c) $x = 6$ and $y = 4$.
(d) $x = 4$ and $y = 4$.
(e) None of the above.

Solution: $x > 5$ for Key to choose Top when Peele chooses Right. $y < 3$ in order for Peele to choose Left when Key chooses Bottom.

Use Figure 1, which represents the environment faced by a monopoly, for questions 4 - 5.

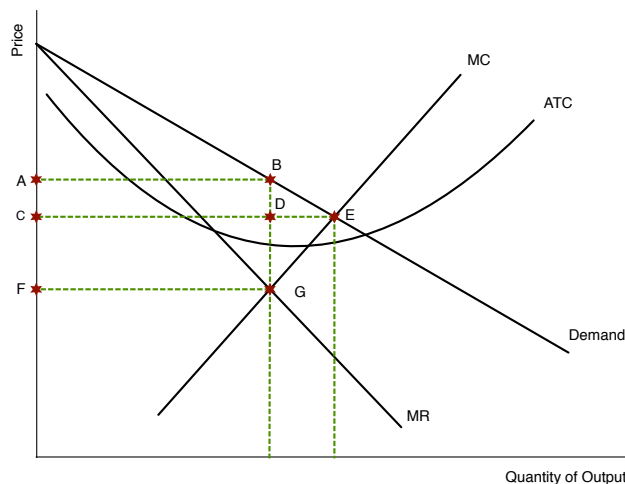


Figure 1: Monopolist Environment

4. Charging price _____ maximizes the monopolist’s profit, while total surplus is maximized at price _____.

- (a) C; A
- (b) F; C
- (c) A; C
- (d) A; F
- (e) None of the above.

Solution: The monopolist produces at Q where $MR = MC$. Trace up to the demand curve to find the price (A). Efficient point is where $P = MC$, i.e., where demand meets the marginal cost curve at point E . Trace across to find the price (C).

5. Which of the following distances represents the mark-up over marginal cost at the profit maximizing quantity?
- (a) Distance AC
 - (b) Distance DE
 - (c) Distance CF
 - (d) Distance BG
 - (e) None of the above.

Solution: Q^* is where $MR = MC$. The mark-up, μ is the difference between the price and MC (distance between the demand and marginal cost curve at Q^*).

6. Firms in monopolistically competitive markets are similar to monopolies in that they both _____ and are similar to firms in perfectly competitive markets in that they both _____.
- (a) are price makers; produce at the efficient quantity
 - (b) make positive profits in the short and long run; produce at the efficient scale in the long run
 - (c) charge a price above the marginal cost; can freely enter and exit the market
 - (d) are in markets with barriers to entry; make zero economic profit in the long run

Solution: See class notes.

7. A monopolistically competitive firm will increase its production if
- (a) marginal revenue is greater than marginal cost.
 - (b) marginal revenue is greater than average total cost.
 - (c) price is greater than average total cost.
 - (d) price is greater than marginal cost.

Solution: See class notes and Homework 3.

Use the following information to answer questions 8 - 9. Suppose we are studying a market where each unit bought and sold incurs an external cost of \$3 on society. However, the sale of this good also provides an external benefit of \$5 per unit.

8. In the absence of government intervention, the market will provide an amount
- (a) smaller than the efficient output level.
 - (b) greater than the efficient output level.
 - (c) equal to the efficient output level.
 - (d) Not enough information given.

Solution: $EB > EC$, so the market will underprovide the good.

9. In order to induce the market to produce the efficient quantity, the government could
- (a) impose a \$2 per-unit tax on sellers.
 - (b) provide a \$5 per-unit subsidy to buyers.
 - (c) impose a \$3 per-unit tax on buyers.
 - (d) provide a \$2 per-unit subsidy to buyers.
 - (e) None of the above.

Solution: $EB - EC = \$2$. Should provide a subsidy so more of the good is produced.

10. Refer to Figure 2.

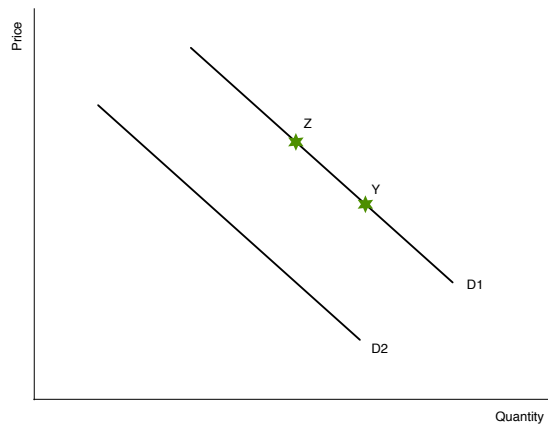


Figure 2: Demand for Shrimp

All else equal, a decrease in the income of buyers who consider shrimp to be an inferior good would cause a move from

- (a) D2 to D1.
- (b) Y to Z.
- (c) Z to Y.
- (d) D1 to D2.

Solution: A decrease in income will increase demand for an inferior good.

11. A non-congested toll road is an example of a _____ because it is _____.
- (a) club good; excludable and non-rival
 - (b) common resource; non-excludable and rival
 - (c) private good; excludable and rival
 - (d) public good; non-excludable and non-rival

Solution: Non-congested - non-rival. Toll road - excludable.

12. The market for Twist is currently at equilibrium and the price of the drink is \$1.00 per can. Under pressure from consumers, the government imposes a price ceiling of \$1.25 per can, leading to _____ in producer surplus and _____ in total surplus.
- (a) no change; an increase
 - (b) an increase; an increase
 - (c) a decrease; a decrease
 - (d) a decrease; no change
 - (e) no change; no change

Solution: The price ceiling is above equilibrium market price, so it will be non-binding.

Use Table 1, which shows the number of hours it takes Katie and Megan to harvest one apple or pear, and the information below to answer questions 13 - 15.

Table 1: Number of hours to harvest one:

	Apple	Pear
Katie	3	5
Megan	2	4

Solution: Katie. $1/3$ apple : $1/5$ pear \Rightarrow 1 pear : 1.67 apples.

Megan. $1/2$ apple : $1/4$ pear \Rightarrow 1 pear : 2 apples.

Terms of trade for both to be better off: 1 pear : x apples, where $1.67 < x < 2$.

If $x < 1.67$, Katie is worse off and Megan is better off.

If $x > 2$, Megan is worse off and Katie is better off.

The parties decide to trade and the following terms are proposed:

- i. 200 apples per 400 pears

Solution: 1 pear : .5 apples - Katie worse off, Megan better off

- ii. 100 apples per 400 pears

Solution: 1 pear : .25 apples - Katie worse off, Megan better off

iii. 55 pears per 100 apples

Solution: 1 pear : 1.82 apples - Both better off

iv. 100 pears per 400 apples

Solution: 1 pear : 4 apples - Megan worse off, Katie better off

13. Given this information, it follows that

- (a) Katie has an absolute advantage in the production of apples, while Megan has an absolute advantage in the production of pears.
- (b) Katie has an absolute advantage in the production of both apples and pears.
- (c) Megan has an absolute advantage in the production of apples, while Katie has an absolute advantage in the production of pears.
- (d) Megan has an absolute advantage in the production of both apples and pears.

Solution: It takes Megan less hours to produce one of either good than Katie.

14. Of the terms of trade proposed, how many would make Katie better off, but would make Megan worse off than without trade?

- (a) 0
- (b) 1
- (c) 2
- (d) 3
- (e) 4

Solution: Katie is better off as long as she gets more than 1.67 apples per pear, while Megan is worse off if she gives up more than 2 apples per pear. (iv) would make Katie better off (receives 4 apples per pear) but would make Megan worse off (gives up 4 apples per pear).

15. Of the terms of trades proposed, how many would make both parties better off than without trade?

- (a) 0
- (b) 1
- (c) 2
- (d) 3
- (e) 4

Solution: Only (iii) would make both parties better off.

16. Chocolate chip cookies and milk are complements. If the demand for chocolate chip cookies increases, then the equilibrium price of milk will _____ and the equilibrium quantity will _____.
- (a) increase; decrease
 - (b) decrease; increase
 - (c) increase; increase
 - (d) decrease; decrease

Solution: An increase in demand for cookies will increase the price of cookies. This will decrease demand for milk (since the price of a complement went up), so the equilibrium price and quantity of milk will both decrease.

17. If chocolate chip cookies and oatmeal raisin cookies are substitutes, the cross-price elasticity of demand between the goods is
- (a) negative.
 - (b) positive.
 - (c) zero.
 - (d) impossible to discern without more information.

Solution: The cross-price elasticity of substitutes is positive.

18. Refer to Figure 3, which shows the market for laptop computers.

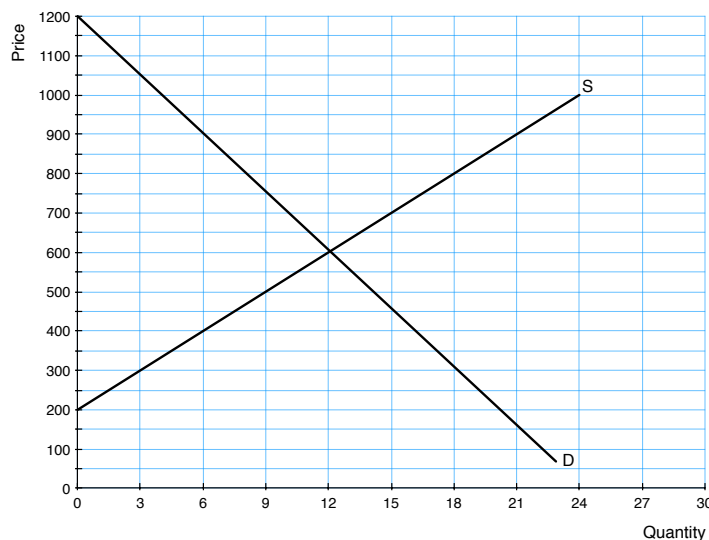


Figure 3: Market for Laptops

If a tax of \$500 is imposed on buyers, then the share of the tax paid by consumers is

- (a) \$200.
- (b) \$300.

- (c) \$500.
- (d) \$900.

Solution: Tax wedge of \$500 $\Rightarrow P_B = 900$, $P_S = \$400$. Price before tax = \$600, so buyers bear \$300 of the burden.

19. Table 2 shows the quantity supplied and demanded at certain prices.

Table 2: Prices and Quantities

Price	Q_d	Q_s
\$10	50	30
\$12	45	35
\$14	40	40
\$16	35	45
\$18	30	50

If the price in the market were \$16, there would be

- (a) a shortage of 10 units.
- (b) a surplus of 45 units.
- (c) a shortage of 35 units.
- (d) a surplus of 10 units.

Solution: At a price of 16, $Q_d = 35 < Q_s = 45$. Surplus of 10 units.

20. The opportunity cost of attending college does **not** include
- (a) the potential salary you could earn by quitting school and working now.
 - (b) the costs of room and board, books, and class materials.
 - (c) the potential salary you could earn after finishing your degree.
 - (d) the psychological costs of stress and lack of sleep.

Solution: (c) is not part of the opportunity cost of going to college, since you are not giving up this higher future salary by attending.

21. As individuals lose their jobs, they buy fewer romance novels. Which of the following might be the income elasticity of demand for romance novels?
- (a) -1.32
 - (b) $-.30$
 - (c) $.54$
 - (d) Either (a) or (b)

Solution: Less income leads to a decrease in Q_d , so romance novels are normal goods. $\varepsilon_d^I > 0$.

22. A firm currently produces 1,000 units of output with an average total cost of \$10.10. 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) \$4,700
- (b) \$300
- (c) \$5,100
- (d) \$400

Solution: At $Q=1,000$, $TC = 10.10 \times 1000 = 10,100$. At $Q=1,001$, $TC = 5,400 + 5,000 = 10,400$. $MC = 10,400 - 10,100 = 300$.

23. The United States currently produces guns and butter. Table 3 shows possible combinations of the two goods the US can produce in a given week (in thousands).

Table 3: Weekly Production of Guns and Butter

Guns	Butter (lbs)
100	800
200	x
300	500

If resources in the US are specialized such that some are better suited to producing guns and others are better suited for butter production, then a possible value for x might be

- (a) 650.
- (b) 550.
- (c) 600.
- (d) 700.

Solution: Specialization of resources leads to increasing opportunity costs. OC of moving from 100 to 200 guns < OC of moving from 200 to 300 guns $\Rightarrow 650 < x < 800$.

24. A per-unit tax of \$6 is imposed by the government. Use Table 4 to answer the question below.

Table 4: Unit Taxes

	Price with no tax	Price with \$6/unit tax on sellers
Price paid by buyers	\$55	?
Price paid by sellers	\$55	\$53.50

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

- (a) \$1.50 more; \$4.50 less

- (b) \$3 less; \$3 more
- (c) \$4.50 more; \$1.50 less
- (d) \$2 more; \$4 less

Solution: $P_B = P_S + tax = 53.50 + 6 = \59.50 . Buyers paying 4.50 more per unit, sellers receiving 1.50 less.

25. The property of production functions whereby the marginal product of an input decreases as the number of inputs increases is called
- (a) increasing returns to inputs.
 - (b) diseconomies of scale.
 - (c) diminishing marginal product.
 - (d) economies of scale.
 - (e) constant returns to scale.

Solution: See class notes.

26. Suppose that the price of wine, a substitute for beer, decreases. As a result, the equilibrium price of beer _____ and total surplus in the beer market _____.
- (a) increases; increases
 - (b) increases; decreases
 - (c) decreases; decreases
 - (d) decreases; increases

Solution: Demand for beer will decrease, which will decrease the equilibrium price and quantity of beer. This will decrease total surplus.

27. Stella's Nail Salon provided 100,000 haircuts last year with a total variable cost of \$800,000. If the average fixed cost of the haircuts was \$5, what was the company's average total cost of the haircuts last year?
- (a) Exactly \$8
 - (b) More than \$10
 - (c) Less than \$8
 - (d) More than \$8, but less than \$10

Solution: $ATC = AFC + AVC = \$5 + 800,000/100,000 = \13 .

28. Matthew is trying to determine how many sticks of RAM he should buy for his computer. Each additional stick increases the speed of his computer by 50%. On a typical day, he would be willing to pay \$100 for each 50% increase in computing power. The total costs of acquiring and installing each stick of RAM are detailed in Table 5.

Table 5: Total Costs of RAM

Sticks of RAM	Total Cost
1	\$40
2	\$100
3	\$175
4	\$265
5	\$370

How many sticks of RAM should Matthew purchase?

- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) 5

Solution: Matthew should buy the next stick of RAM as long as $MB \geq MC$. Find the marginal cost from the total cost column. MC of 1st stick = \$40, 2nd stick = \$60, 3rd stick = \$75, 4th stick = \$90, 5th stick = \$105. $MB = \$100$ per stick, so Matt should buy 4 sticks of RAM.

29. Refer to Table 6, which gives the costs to sell 1 lb of cauliflower for four individuals.

Table 6: Costs for 1 lb Cauliflower

Seller	Cost
Jasmine	\$4.00
Tyler	\$2.50
Deepak	\$3.00
Sarah	\$.50

Suppose the price of cauliflower increases from \$2.00 to \$3.50. The change in total producer surplus that is due to sellers entering or exiting the market because of the price change is

- (a) \$1.00.
- (b) \$3.00.
- (c) \$4.50.
- (d) \$1.50.

Solution: Sell as long as $SC > P$. At $P_0 = \$2$, only Sarah was selling cauliflower and realized $PS_0 = (\$2 - .50) = \1.50 . At $P_1 = \$3.50$, Sarah, Tyler, and Deepak are willing to sell and realize surplus of $PS_1 = (3.50 - .50) + (3.50 - 2.50) + (3.50 - 3) = \4.5 . Increase in surplus to old seller: \$1.50. Increase in surplus due to new sellers: \$1.50.

30. Jen's Shop is a firm in a perfectly competitive market and has the cost structure shown in Figure 4.

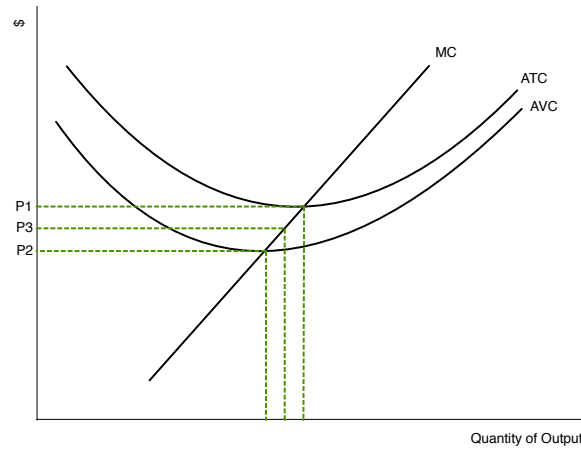


Figure 4: Jen's Shop

If the market price were strictly between $P1$ and $P3$, then the firm would _____ in the short run and make _____ profit.

- (a) operate; negative
- (b) operate; zero
- (c) shutdown; negative
- (d) shutdown; zero

Solution: P is along part of MC curve above AVC , so should operate, but $P < ATC$ and so the firm would make a loss.

Short Answer

For this section, make sure to write legibly and box final answers. **Show your work!** This can be done within the section or *clearly* labeled on the scratch paper provided.

- Table 7 shows the willingness to pay and costs of six buyers and sellers in the market for headphones. Each buyer would like to purchase one pair and each seller has one pair to sell.

Table 7: WTP and Seller Costs for Headphones

WTP	Seller Costs
\$175	\$80
\$100	\$140
\$120	\$120
\$200	\$130
\$140	\$180
\$160	\$155

Use the table to answer the following questions.

Solution:

Table 8: WTP and Seller Costs for Headphones

WTP	SC	TS = WTP - SC	SC _{tax} = SC + tax	TS _{tax} = WTP - SC _{tax} + tax
\$200	\$80	\$120	\$135	\$120
\$175	\$120	\$55	\$175	\$55
\$160	\$130	\$30	\$185	—
\$140	\$140	\$0	\$195	—
\$120	\$155	—	\$210	—
\$100	\$180	—	\$235	—

- (a) If the market price is currently \$120, is there a shortage or a surplus? Explain why. What do you expect will happen to the market price? [2 pts]

Solution: At $P = 120$, $Q_d = 5$ and $Q_s = 2$. This would lead to a shortage and the market price would increase.

- (b) What is the market equilibrium price and quantity in this market? [2 pts]

Solution: Order WTP from highest to lowest and seller costs from lowest to highest. Equilibrium is where they meet. $(P^*, Q^*) = (\$140, 4)$.

- (c) At the market equilibrium, what is the total surplus realized? [2 pts]

Solution: $TS = (200 - 80) + (175 - 120) + (160 - 130) + (140 - 140) = \205 .

- (d) Suppose the government imposes a per-unit tax of \$55 on sellers of headphones. What will be the price buyers pay, the price sellers receive, and the quantity exchanged in the market as a result of this tax? [3 pts]

Solution: The tax will increase seller costs by \$55 each. Find where WTP and SC meet after this. $Q_T = 2$. $P_B = \$175$, $P_S = \$120$.

- (e) Who bears most of the tax burden, buyers or sellers? What does this tell you about the relatively elasticity of supply and demand? [2 pts]

Solution: Sellers bear $(140 - 120) = \$20$ of the tax, while buyers bear $(175 - 140) = \$35$ of the tax. Buyers bear more of the burden because demand is relatively more inelastic than supply.

- (f) What is the tax revenue generated from this tax and the deadweight loss incurred as a result? [2 pts]

Solution: Tax revenue = $\$55 \times 2 = \110 . Easy way to find DWL = unrealized gains from trade = $(160 - 130) + (140 - 140) = \30 (lost surplus from third and fourth transactions that were taking place without the tax).

2. A firm is currently in a market with the conditions outlined in Table 9. The firm has fixed costs of \$1,500 per day.

Table 9: Market Environment

Quantity/day	Total Revenue	Marginal Cost	Variable Costs	Total Costs
1	\$600	\$1,000	1000	2500
2	\$1,200	\$400	1400	2900
3	\$1,800	\$500	1900	3400
4	\$2,400	\$600	2500	4000
5	\$3,000	\$800	3300	4800

Use this information to answer the following questions.

- (a) What type of market environment is this firm in? Explain why. **[2 pts]**

Solution: The firm is in a perfectly competitive market since $P = MR = \$600$.

- (b) Fill in the column labeled “Variable Costs.” **[2 pts]**

Solution: See Homework 2, #29 for an example of this.

- (c) Fill in the column labeled “Total Costs.” **[2 pts]**

- (d) What level of production should the firm operate at? Explain why. **[4 pts]**

Solution: The firm should operate at $Q^* = 0$ (shutdown) because $VC > TR$ at the quantity where $MR = MC$ ($Q = 4$).

- (e) What will be the firm’s profits per day at this production level? **[2 pts]**

Solution: $\Pi = -\$1,500$ (fixed costs).

END OF EXAM

SCRATCH SHEET