

ECON 001
Fall 2016
Final Exam
December 21, 2016
Time Limit: 120 Minutes

Name (Print): _____
Recitation Section: _____
Name of TA: _____

- This exam contains 15 pages (including this cover page) and 17 questions. Check to see if any pages are missing.
- The exam is scheduled for 2 hours.
- This is a closed-book, closed-note exam, no calculator exam.
- Answer the multiple choice questions by circling the correct answer. Make sure that your answer is clearly circled or it will be marked incorrect.
- Write your answers to the other questions in the spaces provided below them. If you don't have enough space, continue on the back of the page and state clearly that you have done so.
- Do not remove any pages or add any pages. No additional paper is supplied
- Show your work. Answers that show no work will receive no credit.
- You must use a pen instead of a pencil to be eligible for remarking.
- This exam is given under the rules of Penn's Honor system.

My signature certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination.

Please sign here _____ Date _____

Question	Maximum	Grade
MC (Q1-14)	39	
1st SA (Q15)	18	
2nd SA (Q16)	22	
2nd SA (Q17)	21	
Total	100	

Multiple Choice Questions (best 13 out of 14: 39 points)

1. (3 points) Suppose that Jeff has three mutually-exclusive ways of spending his afternoon:

1. go to a concert, which he values at \$30 and costs him \$20,
2. take a walk in the park, which he values at \$12 and costs him nothing,
3. go out for ice cream, which he values at \$20 and costs him \$5.

Which of the following would NOT change Jeff's current opportunity cost of going out for ice cream?

- A. The cost of the concert decreases from \$20 to \$18.
- B. It starts to rain, which decreases the value of a walk in the park to \$10.
- C. It is not raining, but in order for Jeff to take a walk in the park, he now has to pay a fee of \$1 (it is no longer free).
- D. The cost of ice cream increases from \$5 to \$10

Solution: A

2. (3 points) Ralph takes 8 hours to build a shelter and 3 hours to hunt a pig. Jack takes 5 hours to build a shelter and 2 hours to hunt a pig.

- A. Ralph has an absolute advantage in hunting pigs.
- B. Jack has a comparative advantage in building shelters
- C. Ralph has an absolute advantage in building shelters
- D. Jack has a comparative advantage in hunting pigs.

Solution: B

3. (3 points) A \$20 per-unit tax on iPods lowers the equilibrium price received by sellers by \$4. Which of the following is true?

- i. The supply of iPods is more elastic than the demand for iPods
 - ii. The supply of iPods shifted upward by \$4.
 - iii. The demand for iPods shifted downward by \$4
- A. Only i.
 - B. Only ii.
 - C. Only iii.
 - D. i and ii.
 - E. i and iii
 - F. None of them is true

Solution: A

4. (3 points) If the price of a Lady Gaga concert ticket in Philadelphia is \$80 per seat, the ticket office can sell 12,000 tickets. If the price of a ticket is \$100 per seat, they can sell 6,000 tickets. Which of the following statements is true?
- A. The demand for this ticket is unit-inelastic, so an increase in the price of the ticket will not change the total revenue of the ticket seller.
 - B. The demand for this ticket is elastic, so an increase in the price of the ticket will increase the total revenue of the ticket seller.
 - C. The demand for this ticket is inelastic, so an increase in the price of the ticket will increase the total revenue of the ticket seller.
 - D. The demand for this ticket is elastic, so an increase in the price of the ticket will decrease the total revenue of the ticket seller.
 - E. The demand for this ticket is inelastic, so an increase in the price of the ticket will decrease the total revenue of the ticket seller.

Solution: D

5. (3 points) The Environmental Protection Agency (EPA) has warned the perfectly competitive Company X that if it produces more than the socially efficient quantity, then it will get shut down. Company X has a marginal cost function $MC = 10Q$ and faces a perfectly elastic demand $P = \$100$. Every unit Company X produces yields 100 dollars worth of air pollution. Which of the following is true? (Note: you may ignore fixed costs).
- A. Company X should produce zero units to satisfy the EPAs demands.
 - B. Company X should produce half of its profit maximizing output.
 - C. The Social Marginal Cost is modeled as $110Q$.
 - D. None of the answers is correct

Solution: A

6. (3 points) Santa Claus is a mythical creature that delivers presents to children on Christmas Eve, but only to children who believe in him, have been good, and celebrate Christmas. Santa Claus on Christmas Eve is
- A. Not a public good because his services on Christmas Eve are excludable
 - B. Not a public good because his services on Christmas Eve congestible.
 - C. A good example of a public good because his time is not rival.
 - D. A good example of a public good because his time is not congestible.

Solution: A

7. (3 points) Consider a producer operating in the perfectly competitive market for corn. After observing the current market price of corn, the producer decides that his best course of action is to exit the market as soon as he can (he still has a lease on the factory for 6 more months), but keep producing his profit maximizing quantity q^* until his lease expires. At the production level of q^* , which of the following statements best describes the producer's cost curves?
- A. AVC is decreasing, ATC is increasing, AFC is increasing
 - B. AVC is increasing, ATC is increasing, AFC is decreasing
 - C. AVC is increasing, ATC is decreasing, AFC is increasing
 - D. AVC is increasing, ATC is decreasing, AFC is decreasing

Solution: D

8. (3 points) Consider a good that has a market demand $P = 10 - Q$. Compare the price elasticity of the individual demand faced by each of the following firms operating in two possible market structures:
- I. A monopolist charging a price of \$4
 - II. A firm in a perfectly competitive market where the equilibrium price is \$4.
 - A. Demand is more elastic for firm I than for firm II.
 - B. Demand is more inelastic for firm I than for firm II.
 - C. Demand is equally elastic for firm I as for firm II.
 - D. Not enough information.

Solution: B

9. (3 points) Two students, Alice and Bobby, are working on a team homework. Each must decide to work hard on the homework or to goof off. Working hard is costly but it increases the team's grade. Each person prefers to goof off if the other works hard – the grade would be better if both worked hard, but it is not worth the extra effort. The payoff matrix is specified below.

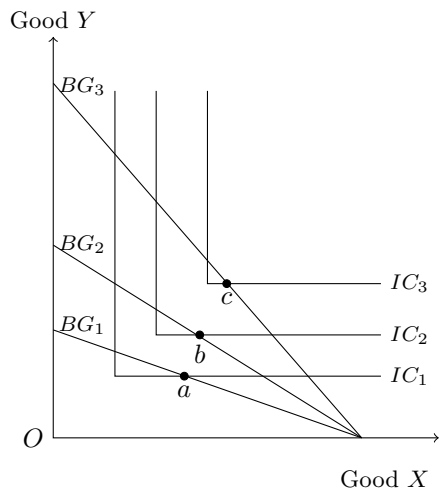
		Bobby	
		Work hard	Goof off
Alice	Work hard	A:3 , B:3	A:1, B:4
	Goof off	A:4, B:1	A:2, B:2

Suppose that their professor hires a TA to spy on them and observe how much effort each of them puts into the homework. Then she tells them: "I will give +1 to each student who worked hard, and a -1 to each student who goofed off." In this case,

- I. Without the spy TA, both students goof off.
- II. With the spy TA, both students work hard.
- III. With or without the spy TA, there is always a dominant strategy equilibrium.
 - A. I only.
 - B. II only.
 - C. Both I and II
 - D. Both II and III
 - E. Both I and III
 - F. All three statements are correct.
 - G. None of the statements are correct.

Solution: F

10. (3 points) In the figure below, BG_1 , BG_2 and BG_3 are budget lines with slopes $-\frac{1}{4}$, $-\frac{1}{2}$ and -1 respectively, and IC_1 , IC_2 and IC_3 are indifference curves.



MRS_i is the marginal rate of substitution between good X and good Y at consumption bundle i . Which of the following is correct?

- A. $MRS_c > MRS_b > MRS_a$
- B. $MRS_a > MRS_b > MRS_c$
- C. $MRS_a = MRS_b = MRS_c$
- D. Not enough information to tell.

Solution: C

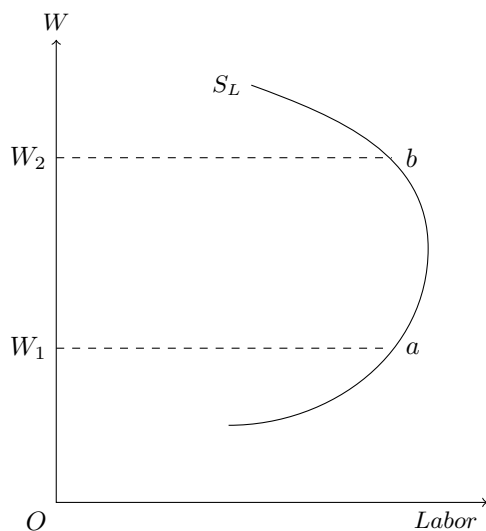
11. (3 points) Suppose Alice consumes only wine and cheese. Alice's income increases, the price of wine decreases, and the price of cheese increases. Consider Alice's budget line with cheese on the vertical axis and wine on the horizontal axis. What will happen to the slope of Alice's budget line?
- A. There is not enough information to tell.
 - B. It becomes steeper.
 - C. It necessarily remains the same.
 - D. It becomes flatter.

Solution: D

12. (3 points) Which of the following statements are correct?
- i. All inferior goods are giffen goods
 - ii. All giffen goods are inferior goods
 - iii. Some inferior goods have an upward sloping demand curve
 - iv. Not all giffen goods have an upward sloping demand curve
- A. i,ii,iii
 - B. i,iv
 - C. ii, iii
 - D. ii,iv

Solution: C

13. (3 points) Below gives a backward-bending labor supply curve.



Which of the following statements are correct?

- i. When wage is less than W_1 , leisure must be a normal good.
- ii. When wage is more than W_2 , leisure must be an inferior good.
 - A. Only i is correct.
 - B. Only ii is correct.
 - C. both are correct.
 - D. Neither is correct.

Solution: D

14. (3 points) Which of the following statements about income inequality is **false**:
- i. The higher the income Gini coefficient, the lower the degree of income inequality.
 - ii. A progressive income tax will decrease the income Gini coefficient and move the Lorenz curve further away from the 45 degree line.
 - iii. When the income Lorenz curve is a single straight line, there must be no income inequality.
 - A. Only i
 - B. Only ii
 - C. Only iii
 - D. i and ii
 - E. i and iii
 - F. ii and iii
 - G. All of them.
 - H. None of them.

Solution: D

Short Answer Questions (61 points total)

15. In the small town of Osorno people like to consume bee honey and apples (which are both very healthy types of food). In the market for honey there is just one firm: Honey Inc, that breeds a hive of bees and collects the honey. On the other hand, the market for apples is perfectly competitive.

The market demand for honey is given by $P_H = 20 - Q_H$. Honey Inc faces the following cost structure:

$$MC = 2Q_H$$

$$VC = Q_H^2$$

$$FC = 200$$

The market demand for apples is given by $P_A = 50 - Q_A$ and the market supply of apples is given by $P_A = Q_A$.

To get any point you must show your work.

- (a) What are the profit maximizing level of output and price of honey? Show your work.

Solution: Honey Inc. equates $MR = MC$, so $20 - 2Q = 2Q \Leftrightarrow Q_H = 5$. The corresponding price is $P_H = \$15$.

- (b) Suppose Honey Inc.'s objective was to maximize its total revenue instead of its profit. What would be the quantity of honey produced, the price of honey, and the profit in that case? Show your work.

Solution: If the Monopoly maximizes total revenue, will produce when $MR = 0$. First we can get that $MR = 20 - 2Q$. So $Q^* = 10$ and we can get the price by plugging in the Demand equation, then $P^* = 10$. The resulting profit is equal to $10 \times 10 - 10^2 - 200 = -200$.

It is well known that bees use the nectar from apple flowers to produce their honey, and in the process they pollinate the apple trees. This facilitates the harvest for apple farmers. As people like apples, honey production generates a positive externality. The marginal external benefit depends on the quantity of honey produced, Q_H : Marginal External Benefit = Q_H . This reduces the social marginal cost relative to the private marginal cost: $SMC = MC - Q_H = Q_H$

- (c) Find the socially efficient quantity of honey and the corresponding price. Show your work.

Solution: Socially efficient quantity is such that $SMC = D \Leftrightarrow Q = 20 - Q \Rightarrow Q = 10$. The corresponding price is $P = \$10$.

The government, knowing that the apple farmers benefit from the bees, makes a proposition. The plan is to subsidize Honey Inc. so that it produces the socially efficient quantity, and to finance that subsidy with a tax on apple farmers.

Suppose the subsidy is a lump-sum subsidy, that covers the loss of Honey Inc. when it produces the socially efficient quantity (such that the firm breaks-even).

- (d) What must be the amount of the lump-sum subsidy? Show your work.

Solution: Honey Inc.'s profit is -200 when it produces the socially efficient quantity of 10. Therefore the subsidy must be equal to 200.

- (e) The government plans to charge a per-unit tax of \$10 on apple farmers to finance the subsidy. With the tax, what would be

- the quantity of apples sold on the market?
- the price paid by buyers and the price received by sellers?

Show your work.

Solution: With the tax, the new equation for the supply of apples is $P_A - 10 = Q_A \Leftrightarrow P_A = Q_A + 10$. The equilibrium with demand yields $Q_A + 10 = 50 - Q_A \Rightarrow Q_A = 20$. The price buyers pay is \$30 and the price sellers receive is \$20.

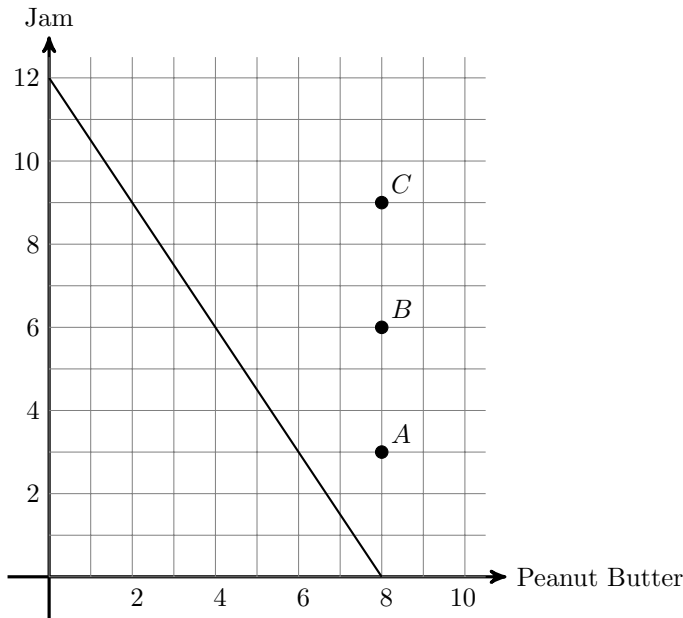
(f) What would be the tax revenue and would it cover the lump-sum subsidy? Show your work.

Solution: The tax revenue is equal to $\$10 \times 20 = \200 . That would be just enough to cover the lump-sum subsidy.

16. Doug and a group of his friends are going on a week long skiing trip. To help prepare for the trip, Doug volunteered to make sandwiches for the drive to the mountain.

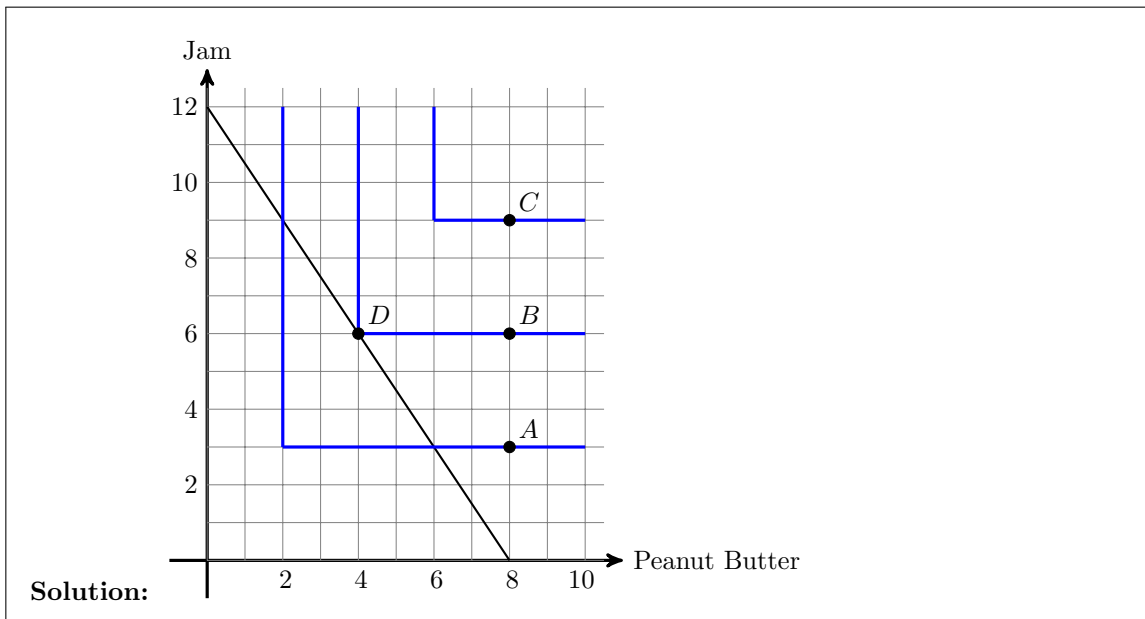
Doug decides to plan the sandwiches first. He decides to make peanut butter and jam sandwiches, and he already has a bunch of bread, so he just needs to buy peanut butter and jam. Doug uses peanut butter and jam as perfect complements: to make 15 sandwiches, he needs exactly two jars of peanut butter and three jars of jam.

(a) Below is Doug’s budget line. Given that he has allocated \$24 to buying peanut butter and jam, what is the price of peanut butter? The price of jam? Show your work.



Solution: The price of peanut butter is \$3 and the price of jam is \$2.

(b) On the above graph, draw the indifference curves that go through the points (A), (B), and (C).



- (c) Find the optimal bundle on the graph above, and clearly label it (D). How many sandwiches is Doug able to make at that point? Show your work.

Solution: He will buy 4 jars of peanut butter and 6 jars of jam so he will make 30 sandwiches.

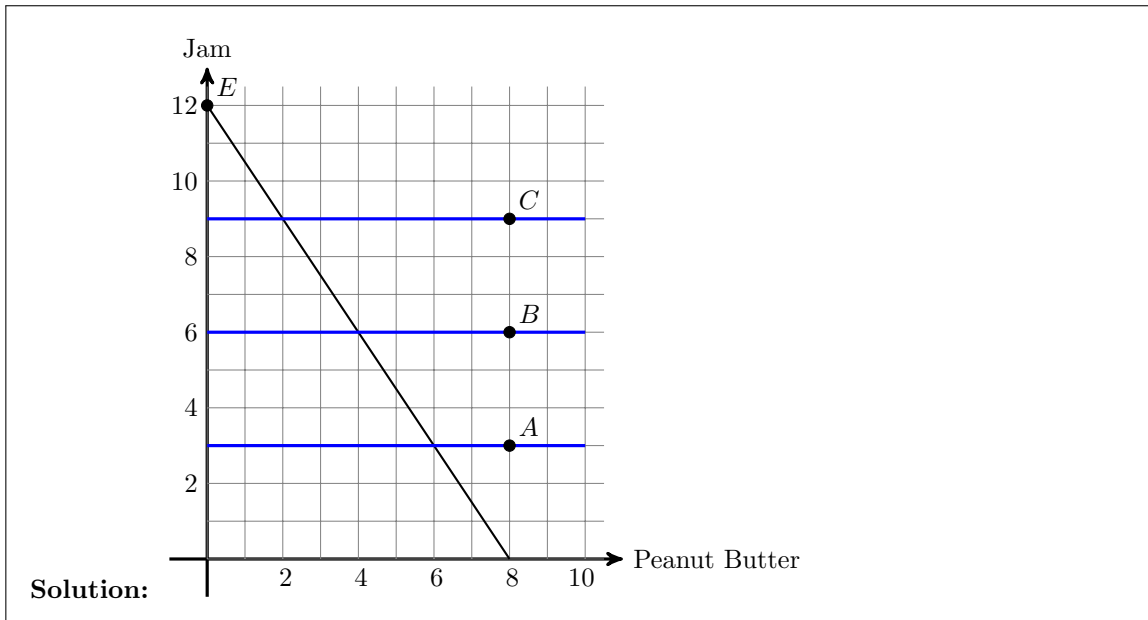
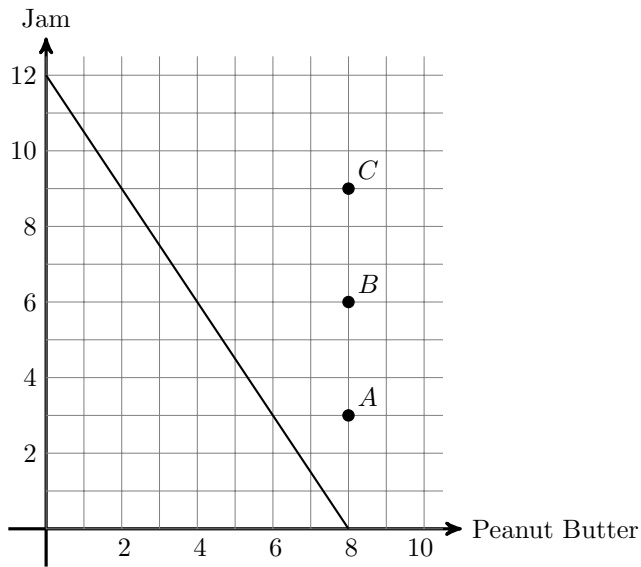
- (d) Suppose Doug goes to an organic store, where the price of peanut butter is \$3 and the price of jam is \$6.
- i. Consider the effect of the higher price of jam on Doug's consumption. Does the income effect or the substitution effect dominate? Or is there not enough information to know which dominates? Why?

Solution: The goods are perfect complements, so the substitution effect of a price change is zero. Therefore if there is a change, the total change will be equal to the income effect, so the income effect will dominate.

- ii. How many jars of jam does Doug now buy? Is Doug's demand for jam elastic, inelastic or unit-elastic? Show your work.

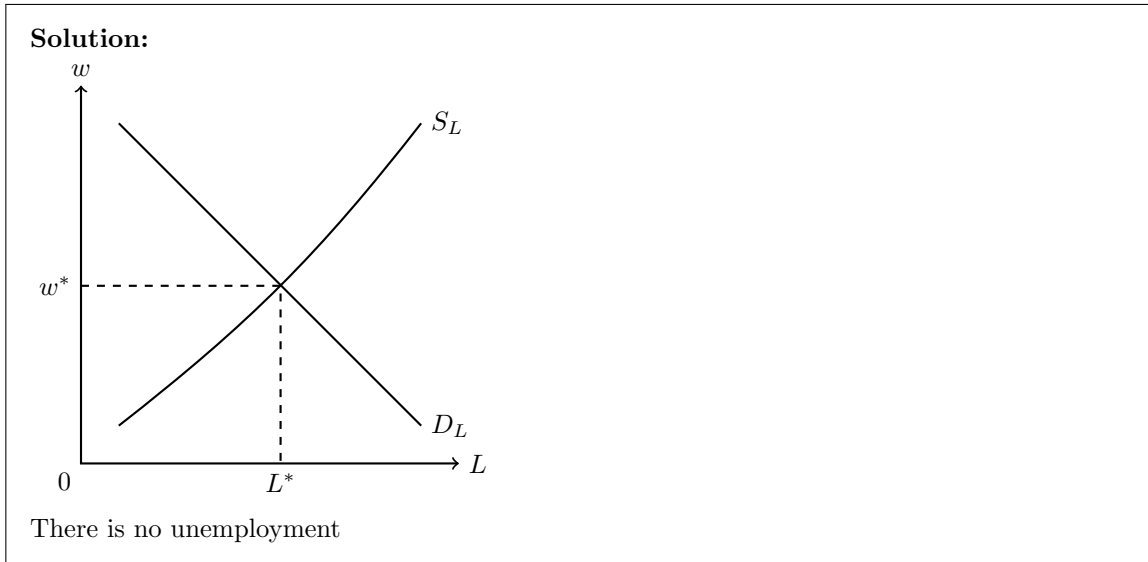
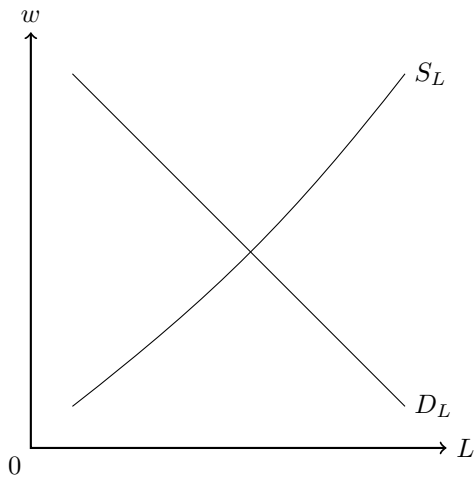
Solution: Doug now buys 2 jars of peanut butter and 3 jars of jam. When the price of jam is multiplied by 3 his consumption of jam is divided by 2, so his demand for jam is inelastic. Formally, the price elasticity is equal to $\frac{(3-6)/4.5}{(\$6-\$2)/\$4} = -0.67$

- (e) As it turns out, all of Doug's friends are allergic to peanut butter, so any jar of peanut butter he buys will be of no use. On the graph below, draw the indifference curves that go through the points (A), (B), and (C) and clearly label the optimal bundle (E).



17. Suppose that the market for rice farmers is currently in equilibrium. Rice farmers produce rice in a perfectly competitive market.

- (a) Suppose the market for rice farmers is perfectly competitive. On the graph below, show the equilibrium wage rate (w^*), employment level (L^*), and unemployment level of rice farmers.



(b) Quinoa is a grain that is used by consumers as a substitute for rice. Suppose that the price of quinoa decreases as a result of an innovation in harvesting quinoa. In this question you are asked to show *graphically* how this change affects:

- the price and quantity of rice in the market for rice
- the wage, employment and unemployment level in the market for rice farmers

Show the first and second-round effects (i.e. the “feedback effect”) on the two graphs below (no explanation needed).

Solution: Demand for rice decreases - shifts in. As a result the price of rice decreases, so the demand for rice farmers rotates counterclockwise. As a result their wage goes down and employment goes down (no change in unemployment as there is still none). As the wage goes down the cost of producing rice goes down so the supply of rice shifts out, further reducing the price of rice, which makes demand for rice farmers rotate counterclockwise even further, which decreases their wage and employment even further, etc... At some point the two markets will reach a new equilibrium, with lower wages, lower employment, lower rice price and lower rice

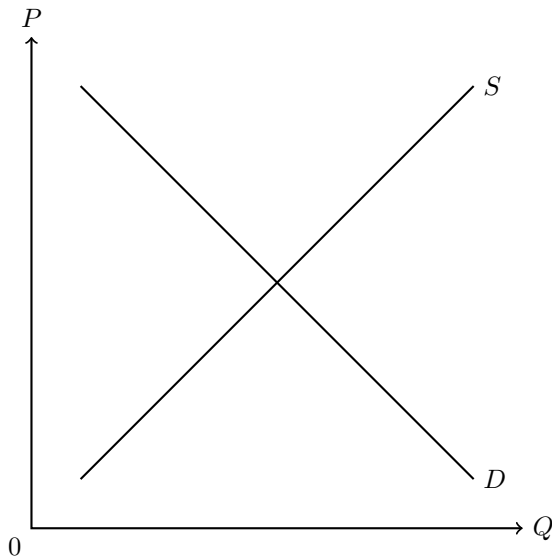


Figure 1: Market for rice

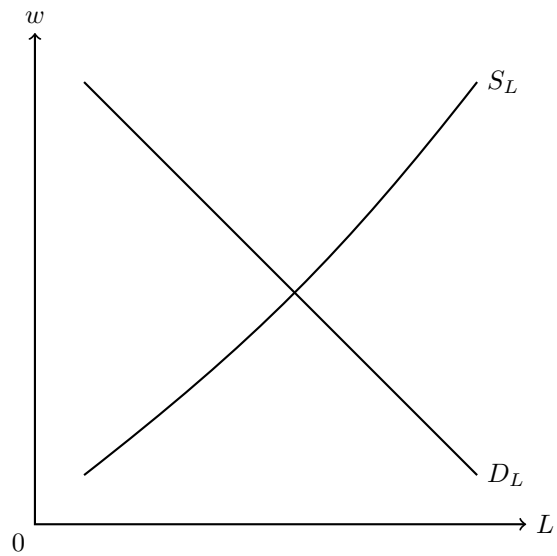


Figure 2: Market for rice farmers

quantity than initially

- (c) Suppose that prior to the decrease in quinoa price, there was a minimum wage in the market for rice farmers, set at the initial equilibrium wage level. In this question you are asked to answer graphically part (b) again, but in the presence of the minimum wage. On the two graphs below, after showing the minimum wage, show the first and second-round effects (i.e. the “feedback effect”) of the quinoa price change on:

- the price and quantity of rice in the market for rice
- the wage, employment and unemployment level in the market for rice farmers

Solution: Demand still decreases as a result of the price change in quinoa, lowering the equilibrium price to P^{**} and quantity to Q^{**} . The lower output price still lowers labor demand and rotates it inward. Since there is a minimum wage, the wage stays the same, so there are no further changes. The minimum wage will generate unemployment and lower the level of employment to L_{min} (see the figure below).

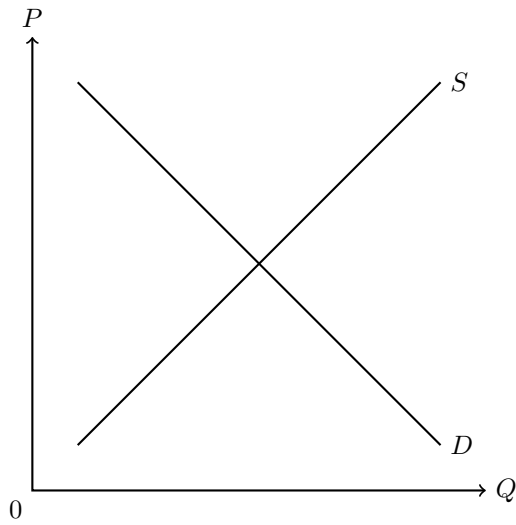


Figure 3: Market for rice

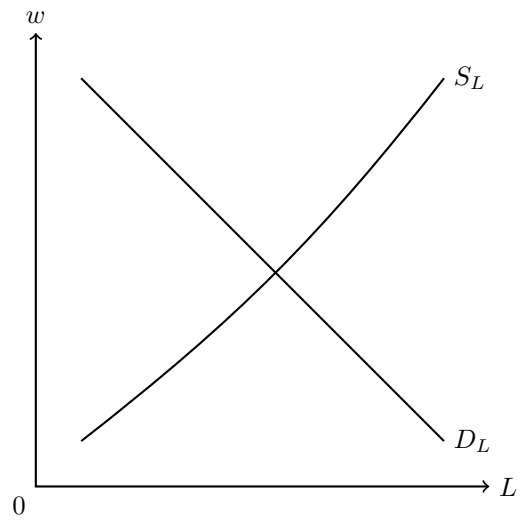
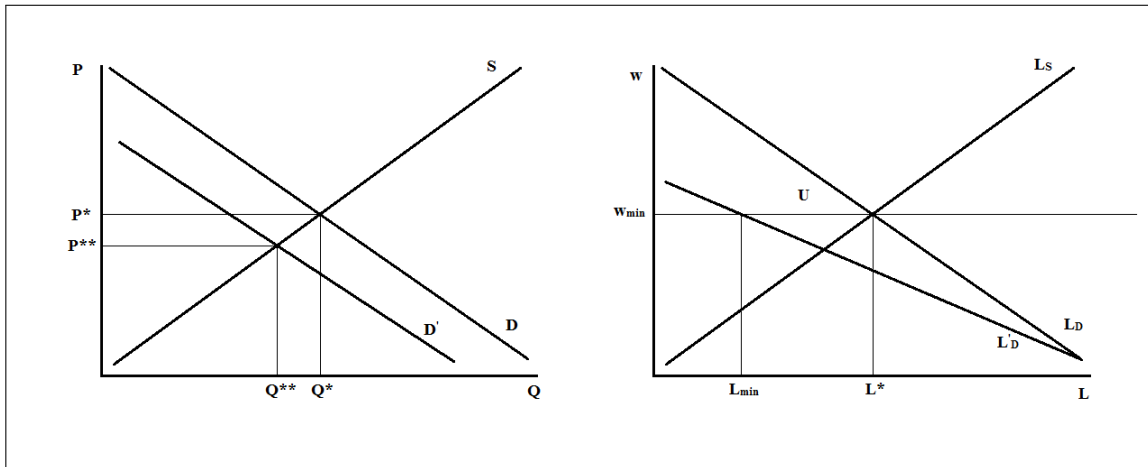
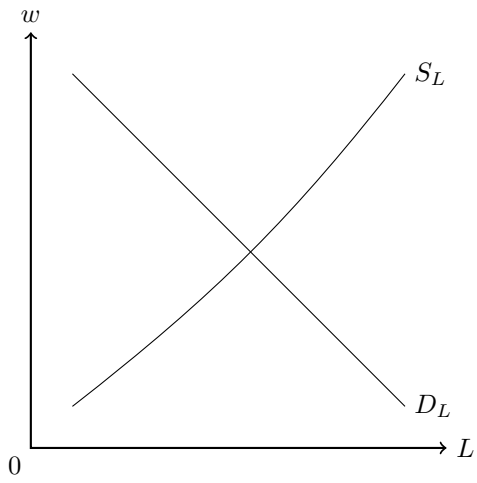


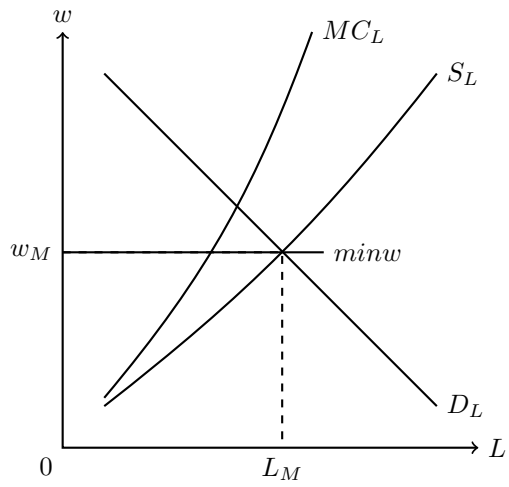
Figure 4: Market for rice farmers



- (d) Now suppose that there has been no change in the price of quinoa, but the minimum wage is at the same level as in part (c). Suppose the market for rice farmers is a monopsony. In the graph below, show the wage rate (w_M), employment level (L_M), and unemployment level of rice farmers.



Solution:



There is no unemployment