

Econ 001: Final
May 5th 2006

Instructions:

- **This is a 120-minute examination.**
- **Write all answers in the blue books provided. Show all work. Use diagrams where appropriate and label all diagrams carefully.**
- **Write your name and your Recitation Instructor's name in every blue book that you use.**
- **This exam is given under the rules of Penn's Honor system.**
- **All blue books, blank or filled, must be handed in at the end of this exam. No blue books may be taken from the room.**
- **The use of Programmable Calculators is in violation of Departmental rule. It is strictly forbidden!**

The exam has 2 parts.

Part 1 consists of 21 multiple-choice questions. Please use the first page of a blue book to record your answers.

Part 2 consists of 2 short answer questions. Please use a separate blue book for each.

Good Luck!

Part I: Multiple Choice Questions (21 questions, 2.5 points each/50 points total):

1. David is considering going to school at Penn for four years. The tuition is \$25,000 a year, but he knows that after graduation he can earn \$30,000 more than high school graduates for each subsequent year of work. If he does not go to college, he can work right away and earn \$20,000 a year. What is David's true economic cost of going to Penn for 4 years?
 - a. \$20,000
 - b. \$45,000
 - c. \$80,000
 - d. \$180,000
2. If interest rates are positive, and assuming that wages and tuition are fixed and the same as in the previous question, is the economic cost:
 - a. Bigger than calculated in Q1.
 - b. Smaller than calculated in Q1.
 - c. The same as in Q1.
 - d. The answer would depend on the exact interest rate.

3. Amy and Ben are married. Their production possibilities are given in the next table:

	Potatoes (per day)	Tomatoes (per day)
Amy	10	20
Ben	3	15

Which of the following is true?

- a. Amy has an absolute advantage in both goods.
- b. Amy has a comparative advantage in Tomatoes.
- c. Ben has a comparative advantage in Potatoes.
- d. All of the above are correct.

4. Suppose Amy and Ben choose to produce 11 potatoes. What must be the marginal benefit of the last potato in this case?

- a. 2 tomatoes
- b. 5 tomatoes
- c. 3 tomatoes
- d. 0 tomatoes

5. A decrease in the price of a good and a resulting increase in total expenditure on this good are associated with:

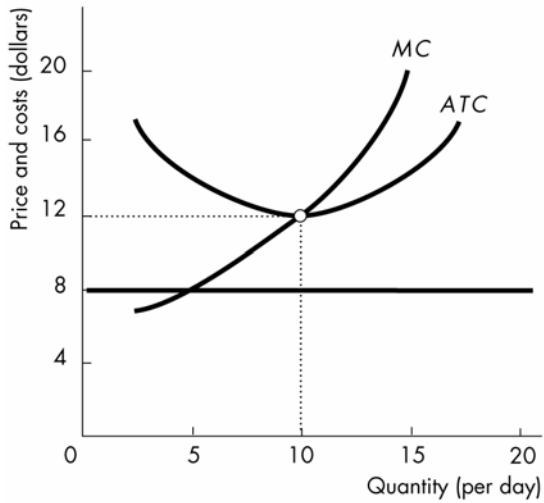
- a. Inferior goods
- b. Substitute goods
- c. Elastic demand
- d. Normal goods

6. Consider the following cost function: $TC(Q)=25+15Q$

The fixed cost and marginal cost of the second unit are (respectively):

- a. 25, 30
- b. 25, 15
- c. 15, 25
- d. 30, 25
- e. Not enough information to decide

Mr. Potato is a small farmer in Idaho. The graph below depicts his marginal cost and average total cost curves (per ton) of growing potatoes. Use this graph to answer questions 7 & 8.



7. If Mr. Potato faces a price of \$8 a ton, how many potatoes will he choose to sell in the short run?
- 10 units a day
 - 5 units a day
 - 0 units a day
 - There is not enough information to answer this question.
8. The aggregate demand curve in the potato market is:
 $Q = 5,000 - 50P$
 In the long run this industry will have:
- Zero firms
 - 10 firms
 - 440 firms
 - 460 firms

9. Amy and Sam are each deciding whether they want to go to a concert or a baseball game. They measured their happiness of events in dollar terms as follows:

		Sam	
		Concert	Baseball
Amy	Concert	Amy: \$10 Sam: \$10	Amy: \$40 Sam: \$60
	Baseball	Amy: \$20 Sam: \$20	Amy: \$30 Sam: \$80

Which is the **correct** statement?

- a. Amy will go to the concert whether Sam joins her or not.
- b. Sam will go to the concert whether Amy joins him or not.
- c. Going to baseball game together is the Nash equilibrium since it generates the highest joint happiness.
- d. Amy will go to concert and Sam will go to baseball game.

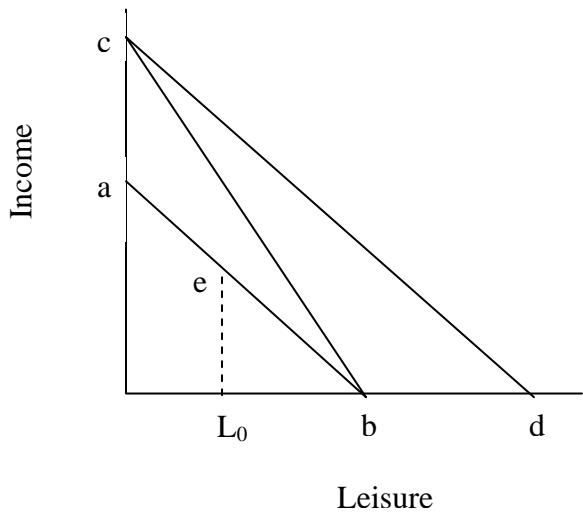
10. A Monopolistically competitive market is characterized by:

- a. Differentiated products.
- b. Long run profits.
- c. Cost curves that are always declining.
- d. All of the above.

11. Suppose the market for paper towels is perfectly competitive. The market is initially in long run equilibrium. Now, the government decides to tax each unit of paper sold. What happens to the price of the good in the short and long run respectively?

- a. in the short run: higher prices, long run: higher price
- b. in the short run: higher prices, long run: same prices
- c. in the short run: identical prices, long run: same prices
- d. in the short run: identical prices, long run: higher prices

The following three questions refer to the graph below, which depicts several budget lines for leisure and income. The individual is initially on budget line ab and consuming at point e . The wage rate then increases.



12. After the wage increase, the individual selects a new consumption bundle somewhere on the line segment
- bc
 - cd
 - ae
 - be
13. The substitution effect of this wage increase induces the individual to choose a quantity of leisure that is
- Greater than L_0
 - Less than L_0
 - Exactly L_0
 - Not enough information to answer the question
14. Suppose leisure is a normal good. Then:
- The supply of labor in this example is backward bending
 - The supply of labor in this example is upward sloping
 - The supply of labor in this example is completely inelastic
 - Not enough information about the supply of labor

15. Baskin & Robins produces ice cream in a perfectly competitive market and hires workers in a perfectly competitive input market. Recently, they laid off 20 workers. Which of the following **cannot** explain it?

- a. Wage went up.
- b. MP of workers went down.
- c. Consumers' income went up and ice cream is a normal good.
- d. South Beach diet made ice cream less popular.

16. The bicycle industry is perfectly competitive and the price of a bike is \$100. Bike manufacturers hire workers at the wage rate of \$200. There is also a cost of materials of \$50 per bike. Riding bicycles reduces pollution, so it has a positive externality of \$30 per bike.

Which of the following is **incorrect**?

- a. MP of last worker hired is 4.
- b. MP of last worker hired is 2.5.
- c. A government subsidy would increase the surplus generated by this market.
- d. Less workers are employed than the socially desirable level.

17. A firm is considering 2 investments. Each requires the purchase of a machine the costs \$5,000. Investment A will yield revenues of \$2,000 a year for the next 3 years. Investment B will yield revenues of \$1,500 a year for the next 4 years. Using the Net Present Value method we know that:

- a. If the firm invests in investment A they will surely invest in B as well.
- b. If the firm invests in investment B they will surely invest in A as well.
- c. Clearly neither investment is worth while.
- d. At any interest rate both investments are worth while.

18. Employed workers earn \$100,000 a year and unemployed workers earn \$0. Which of the following is **incorrect**?

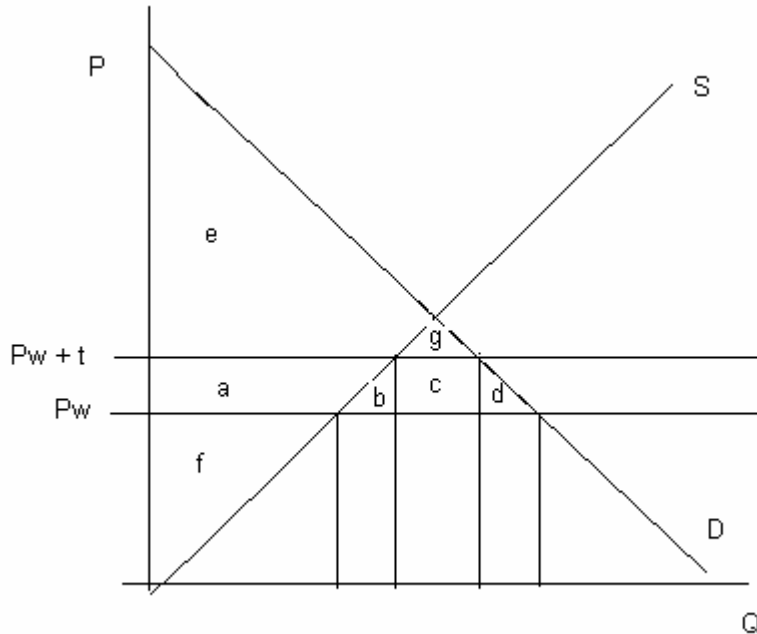
- a. Laying off every employed worker will make GINI ratio to fall.
- b. Taxing employed workers will make Lorenz curve closer to 45 degree line.
- c. Hiring every unemployed worker will make GINI ratio to fall.
- d. Giving unemployment benefit will make the line of perfect equality steeper.

Questions 19-21 refer to the supply and demand graph of the United States of Atlantis. It is considering whether it should open trade with the rest of the world.

P_w = world price;

$P_w + t$ = price with tariff;

The letters {a, ..., g} refer to the areas.



19. What is the gain in total surplus if the country decides to trade (with no tariff)?

- a. No gain
- b. $b + c + d + g$
- c. g
- d. $a + b + c + d$

20. The country is considering a tariff t on imports, what is the gain/loss in domestic producer surplus and gain/loss in consumer surplus due to the tariff?

- a. Producer gain: a ; Consumer loss: $b + c + d$
- b. Producer gain: $a + c$; Consumer loss: $a + b + c + d + g$
- c. Producer gain: a ; Consumer loss: $a + b + c + d$
- d. Producer loss: f ; Consumer gain: $a + b + c + d$

21. The tax revenues from a tariff t on imports would be:

- a. $a + b + c + d$
- b. $b + c + d$
- c. $b + d$
- d. c

Answer Key:

1. d
2. b
3. a
4. b
5. c
6. b
7. d
8. c
9. d
10. a
11. Omitted
12. a
13. b
14. d
15. c
16. b
17. b
18. d
19. b
20. c
21. d

Part II: Short Answer Questions (25 points each/50 points total):

Please use a separate blue book for each question.

Explain answers carefully using graphs where appropriate. Your grade depends on your explanation as well as your answer: so show your work!

Q1.

Fiume is the only lemonade stand on the island of Abyssinia and therefore functions as a monopolist in the market for lemonade on the island. Its total cost function for lemonade on a given night is given by

$$TC(Q) = Q^2 + 200,$$

so that its marginal cost is given by

$$MC(Q) = 2Q.$$

The demand for lemonade in Abyssinia on a given night is given by

$$P = 40 - Q$$

and so marginal revenue is

$$MR = 40 - 2Q.$$

- (a) What is the equilibrium price and quantity for lemonade on a given night in Abyssinia? What are Fiume's profits?

ANSWER: Setting $MR = MC$ yields $Q = 10$, and then the demand curve yields $P = 30$. Fiume makes a profit of $TR - TC = 300 - 300 = \$0$.

Points: 5

MR=MC: 1 point

Q=10:1 point

P=30: 1 point

Profit: 2 points

The management at Fiume discovers that by adding live music, it can increase the demand and marginal revenue for lemonade on a given night to

$$P = 60 - Q,$$

$$MR = 60 - 2Q.$$

Even better news for Fiume is that the management's friends are all musicians who are actually willing to play for free, so Fiume's cost structure remains the same.

- (b) What is the equilibrium price and quantity for lemonade on a given night in Abyssinia once Fiume adds live music? What are Fiume's profits now?

ANSWER: $MC = MR$ yields $Q = 15$, demand curve yields $P = 45$. Fiume's profits are now given by $TR - TC = 675 - 425 = \$250$.

Points: 3

Q=15:1 point

P=45: 1 point

Profit: 1 point

The government of Abyssinia receives complaints from some of its citizens who live close to Fiume about all the noise from the live music there.

- (c) Is the noise a pure public good? Explain.

ANSWER: The noise is both non excludable and non rival so it is indeed a pure public good.

Points: 4

2 for each term

After gathering all the facts, the government discovers that the noise from the music is creating a negative externality of \$300 each night. After crunching some more numbers, the government finds that this amounts to **an average** of \$20 per lemonade sold at Fiume.

- (d) Write down the social total cost (STC) and the social marginal cost (SMC) function for the lemonade market in Abyssinia on a given night when Fiume has live music.

ANSWER: $STC(Q) = PTC(Q) + \text{total externality} = Q^2 + 200 + 300 = Q^2 + 500$.

$SMC(q) = PMC(q) + \text{marginal externality} = 2Q + 0 = 2Q$.

Note that in this case the externality is due to the noise and not the selling of lemonade. Therefore the marginal impact of selling one more lemonade is ZERO.

Points: 4

STC=PTC+ externality: 1 point

= Q^2+500 : 1 point

SMC=PMC+ marginal externality: 1 point

= $2Q$: 1 point

- (e) What is the socially efficient amount of lemonade in Abyssinia on a given night when Fiume has live music? How does this compare to the quantity you found in part b. Explain why this is the case.

ANSWER: The socially efficient amount can be found by setting $MB = SMC$, so that we have $60 - Q = 2Q$, or $Q = 20$. This is *higher* than found in part b. This is because the firm, a monopolist, under produces since $MR < P = MB$. Note that the externality has *no effect* on the efficient production of lemonade as it does *not* depend on the *amount* of lemonade produced.

Points: 5

MB=SMC: 1 point

Q=20: 1 points

Higher than b: 1 point

Explanation (due to monopoly) 2 point

Note: a student who wrote that $SMC=2Q+20$ (in d) can get at most 3 points in this part.

The government of Abyssinia decides to tax Fiume \$20 per lemonade. It knows that by doing so it will not entirely eliminate the noise, but understands that it can achieve the efficient balance of noise by internalizing the external cost (in the form of noise) of the lemonade market.

- (f) Do you agree with the government's reasoning? Explain why or why not.

ANSWER: No. The externality has nothing to do with how many beers are sold, and so a per-unit tax of \$20 does not internalize the cost.

Points: 4

Note: a student who wrote that $SMC=2Q+20$ (in d) can get at most 2 points in this part.

Q2.

This question asks you to analyze the market for labor using **multiple** graphs. Make sure each graph you draw is large, clear and well labeled.

- a. Draw a downward demand curve for labor. Why do we assume the demand for labor is downward sloping?

Answer:

The demand for labor is derived from the MRP which equals the Marginal physical product of labor times the price of the output. The MP is declining due to the law of diminishing returns so that MRP and the demand must be downward sloping.

Points: 3

D=MRP: 1 point

MRP=p*MP: 1 point

MP declining due to law of DMR: 1 points

- b. Draw an upward sloping supply curve. Why do we assume the supply of labor is upward sloping?

Answer:

Because as wages increase the opportunity cost of leisure increases and people will substitute away from leisure towards income thereby working more.

Points: 3

Need to refer to opportunity cost of leisure or to the substitution effect for full credit.

- c. What are the equilibrium wage rate, employment & unemployment in this market?

Points: 4

Wage: 1

Employment: 1

Unemployment=zero: 2

- d. Is there any economic rent generated by the labor market? If so: show it graphically. If not, explain why not.

Answer:

Economic rent is the area under the equilibrium wage and above the supply of labor. It is compensation over and above O.C. of time.

Points: 3 (for marking on graph)

e. How can we interpret the area under the demand curve and above the equilibrium wage rate?

Answer:

These are gains from labor over and above payment for labor.

The area is the difference between the revenue product of labor and the wages paid. It is equivalent to producer surplus.

Points: 3 (For intuition/explanation)

Re-draw the demand & supply of labor graph. Answer parts f & g using the **new** graph

f. If the government imposes a tax on labor of \$ t per unit of labor, what will happen to the equilibrium wage paid by the firms? Earned by the workers?

Answer:

The wages paid by firms will increase but the wages received by workers will decrease. The difference between the two is \$ t .

Points: 3

Shifting supply curve up by \$ t : 1 point

Wage paid increase: 1 point

Wage received decrease: 1 point

g. What is the effect on employment and unemployment?

Answer:

Employment will decrease. Unemployment still zero.

Points: 3

Employment down: 2 point

Unemployment zero: 1 point

Economists often believe that tax on labor has small impact on efficiency.

h. What must they be assuming about the elasticity of the supply of labor? Use a **new** graph to answer this part.

Answer:

They must be assuming that the supply of labor is relatively inelastic. In that case there will be only a small decrease in employment and little dead weight loss due to tax.

Points: 3

Supply inelastic: 2 point

Small dead weight loss due to tax: 1 point