Econ 001: Final Exam (Dr. Stein) Answer Key
May 9, 2008

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!**

Check: The Exam has 2 parts.
Part 1 consists of 10 multiple-choice questions. Please write you answers in blue book 1.
Part 2 consists of 2 short answer questions. Please use one book for Q1 & Q2.
Part 3 consists of 2 short answer questions. Please use one book for Q3 & Q4.

Part I: Multiple Choice Questions (4 points each/40 points total):

1. Suppose that your parents have invited you to join them at their Wyoming horse ranch for the summer. You love riding and this proposal is worth $1000 to you. You have two other alternatives for this time: i) you could work as a non-paid intern for Vogue, where the job is worth $3000 in psychological benefit because you love fashion; or ii) you can stay in Philadelphia and work for McDonalds earning $2,000, a job that has no other benefits to you. Assume living expenses are zero for both jobs, what is your Opportunity Cost of going to Wyoming?

   a. $0
   b. $1000
   c. $2000
   d. $3000
   e. $4000
   f. $5000

2. Suppose that Alice and Bob produce Yoyos and Zippers. Alice has an absolute advantage in Yoyo production; Bob has the absolute advantage in Zipper production. Each has a constant opportunity cost. If Alice and Bob each split their time between making Yoyo and Zipper, then:

   a. The joint economy PPF is bowed in (i.e., becomes less steep).
   b. The joint economy is not producing efficiently.
   c. There are no prices at which Alice and Bob would have been willing to trade.
   d. There is no point of specialization on the joint PPF.

3. Suppose that the inverse demand for A is given by: $P_A = 200 – 5Q_A - 0.001I + P_B$, where I is income and P_B is the price of B. The supply for A does not depend on the price of B. Which of the following statements is true?

   a. A is normal; A and B are complements
   b. A is normal; A and B are substitutes
   c. A is inferior; A and B are complements
   d. A is inferior; A and B are substitutes

4. Suppose that gin and tonic water are complements. If the government **decreases** the tax on gin, then you would expect that:

 a. the price of tonic water increases, and the quantity bought increases
 b. the price of tonic water increases, and the quantity bought decreases
 c. the price of tonic water decreases, and the quantity bought increases
 d. the price of tonic water decreases, and the quantity bought decreases

Q meat

42

32
28

C

6
4

B

A

I₀

I₁

5 12 14   21 22   28

Q potatoes

NB: Not drawn to scale
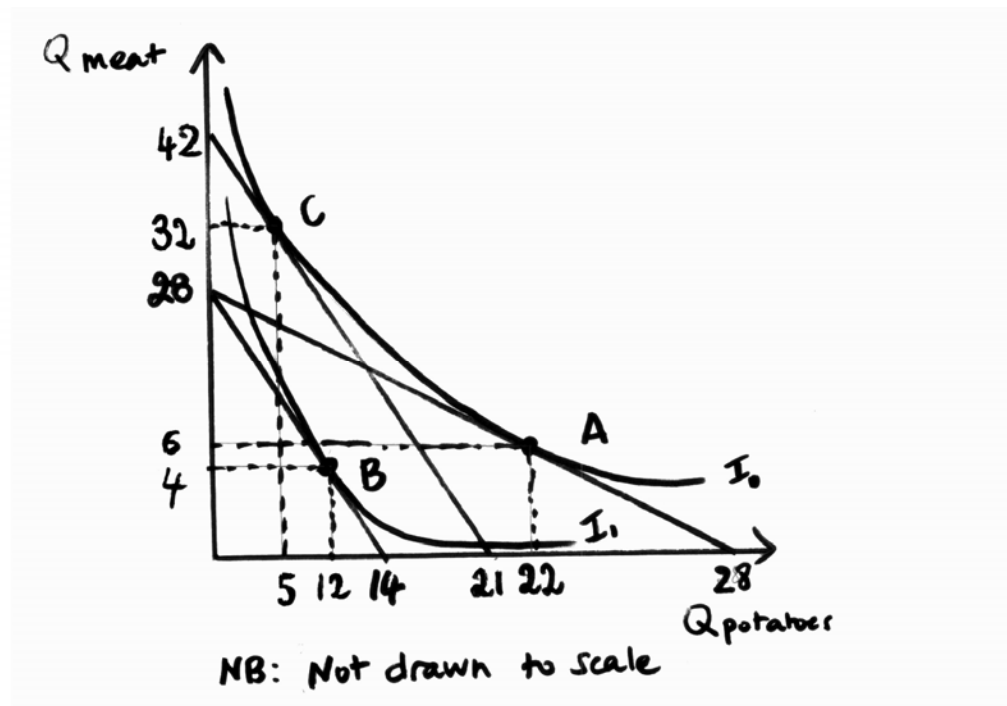
5. The above graph shows Sacha's consumption in 2000 (A) and 2001 (B) of meat and potatoes in kilos. You know that the price of meat remained constant at 10 dollars a kilo.

Which of the following is correct?

    a. Income in 2000 was $280.
    b. Price of potatoes in 2000 was $10 a kilo.
    c. Both a and b are correct.
    d. Neither a or b are correct.

6. Which of the following points will be on Sacha's potato demand curve:

    a. (Q=12, P=12), (Q=15,P=14)
    b. (Q=12, P=20), (Q=14,P=10)
    c. (Q=22, P=10), (Q=9,P=20)
    d. (Q=22, P=10), (Q=12,P=20)

7. Looking at the change in Sacha's potato consumption between 2000 (A) and 2001 (B), which of the following is true:
    a. The income effect is -17 potatoes, and potatoes are a normal good
    b. The income effect is + 7 potatoes, and potatoes are an inferior good
    c. The income effect is -10 potatoes, and potatoes are a normal good
    d. The income effect is -17 potatoes, and potatoes are an inferior good

8. Paper4Me produces paper using both fixed and variable inputs. We know that at their current production point their marginal product is decreasing. From this we can conclude that:

   a. Average variable cost is rising.
   b. Average total cost is rising.
   c. Both (a) and (b)
   d. None of the above.

9. Two tobacco firms, Philip Morris and Camel, are competing and have to make a decision about advertising. If one firm uses advertisements while the other doesn't, then it will gain market share. The firms have the following payoffs in millions of dollars:

		Philip Morris	
		Advertise	Don't Advertise
Camel	Advertise	Philip Morris:1 Camel:1	Philip Morris: 2 Camel: 7
	Don't Advertise	Philip Morris: 7 Camel: 2	Philip Morris: 6 Camel: 6

Which of the following statements is true?

a) It is a Nash equilibrium for both firms to advertise.
b) Philip Morris will always choose to advertise, regardless of what Camel does.
c) If the government made advertisements for tobacco illegal, so that neither firm has the option of advertising anymore, then both firms will be better off (compared to the Nash payoffs).
d) The game has multiple Nash equilibria.
e) All of the above are correct.

10. Suppose the poor and rich spend the same dollar amount on gasoline. A summer moratorium on gasoline taxes (i.e., removing these taxes over the summer) would be:

   a. Regressive.
   b. Progressive.
   c. Income neutral.

(Note: there are only 3 options in this question)

Answers:
1. **D**
2. **B**
3. **D**
4. **A**
5. **C**
6. **D**
7. **B**
8. **D**
9. **D**
10. **B**

Part II: Short Answer Questions 1&2.

Please use one Blue Book to answer Q1 & Q2.

Q1. (**20 points**)

Suppose that only oil is used to heat houses in Vermont. One unit of oil produces one unit of heat. Assume that a perfectly competitive oil market where the private marginal cost of oil is

$$PMC = 150 + Q^S$$

and the demand for heat in Vermont is given by:

$$Demand:\ P = 1650 - 2Q^D$$

a. What is the equilibrium price and quantity for the oil market in Vermont?

Answer:
In equilibrium S=PMC=P=MB, so 150 + Q^S=1650 – 2Q^D or Q*=500 & P*=650

Points: 4
Set up:2
Q=500:1
P=650:1

b. Is this outcome efficient? Explain briefly.
Answer:
The outcome is efficient as PMC=SMC & P=PSB so we get SMC=SMB at Q*.

Points: 2 points.
Full credit if answer using no DWL, maximizing surplus or any similar method.

For the remainder of the question, assume that oil burning causes $300 in environmental damage for each unit burned.

c. How do your answers to parts a and b change? Explain briefly.

Answer:
The answer to part a stays the same.
In part b we now have SMC(Q*)>PMC(Q*)=SMB(Q*) so we get that at Q* SMC>SMB or inefficiency.
You could also show this graphically by showing Dead Weight Loss.

Points:3
Part a stays the same: 1
Under the new assumption this quantity is inefficient: 2 points (1 for explanation, 1 for answer).

d. What is the efficient amount of oil to be used?
Answer: 2
     For efficiency SMC= MB, or $150 + Q^S +300=1650 – 2Q^D$ or $Q^{eff}= 400$
Points:
1 for Q=400
1 for explanation.

Note: give full credit even if students answered this part as part of c.

e. What tax policy could the government take to induce an efficient quantity of oil? Explain briefly.
Answer:
We need a tax policy that would internalize the externality. In this case, a tax of $300 per unit would work.

Points: 3
$300: 1 point
Per unit: 1 point
Explanation: 1 point

Suppose now that there is an alternative source of heat in Vermont, wood. Demand for wood is downward sloping and supply of wood is completely elastic.

Suppose wood causes $500 in environmental damage per unit.

f. If the government does not intervene in the oil market show graphically the amount of wood consumed. Show graphically the total cost of the externality in the wood market?
Answer:
Downward sloping demand and elastic supply at P*=PMC (note P* not given) gives us Q_W^*.
The SMC though is at 500+P*.
The cost of the externality is the area of the rectangle $Q_W^* * 500$.

Note that we ask for total externality not the per unit externality (that was given in the question!)

Points: 2
Graph: .5
Q_W^*: .5
Area of externality:1 point

Note: give full credit if students shifted down SMB by 500 *instead* **of shifting up SMC by 500.**

g. If the government does intervene in the oil market with the tax you suggested in part e, what will be the effect on the graph you drew in part f? What is the amount of wood consumed now? Show graphically the new total cost of the externality in the wood market.

Answer:
As oil and wood are substitutes, an increase in the price of oil will shift demand for wood out. More wood will be consumed and the externality will be larger.

Points: 3
Shift our of D: 1
Qw bigger: 1
Externality bigger: 1

h. What is the effect of reducing the externality in the oil market on the externality created by the wood market?
Answer:
Reducing one externality has made the problem in the alternative mkt worse.

Points: 1

Q2. (10 points)

Aida and Brahim live in the same apartment complex. Aida and Brahim currently have no access to any TV channels whatsoever and are considering subscribing to satellite TV.

For the entire question, assume that having a connection to the satellite is worth $200 to Aida, and $300 to Brahim.

a. Suppose that a new satellite dish costs $450, and that both Aida and Brahim would be able to use it. Is it socially efficient for them to buy the satellite dish? Will either of them agree to incur the cost by themselves? Explain briefly.

Answer:
It is efficient for Aida & Brahim to get a satellite TV as
SMB=300+200>450=MC.
Neither will pay for it by themselves as for each PMB<MC.

Points: 2
1 for socially optimal.
1 for not individual compatible.

For the rest of this question, assume that Aida has an income of $200, and Brahim has an income of $700.

    b. Aida & Brahim decide it would be fair if they each pay the same proportion of their income. Is there a payment scheme that they will agree to? Show your calculations.

Answer:
They need to set t such that t*200+t*700=450 so that the dish can be paid for.
But t must also satisfy:
t*200<200 so that Aida will agree to the plan
t*700<300 so that Brahim will agree to the plan.

Note that the lowest t that satisfies the first equation is .5 and that this valuates Brahim's constraint: .5*700=350>300 so that Brahim will not agree to this tax.

Points: 4
1 for *each* equation.
1 for showing such a t does not exist.

    c. Brahim tells Aida that if she gives him some of her money first, they can find a way to make a proportional payment scheme work. Is Brahim right? If so, how much should Aida give him? (Note: you may assume that Brahim is honest and will follow through with any agreement they agree on).
Answer:
Suppose Aida gives Brahim $100. Now setting t=.5 we get:
t*100+t*800=450 so this indeed pays for the dish.
Will both parties vote for this?
Aida's cost of the plan is 100+.5*100=150<200 so she will vote for it.
Brahim's cost of the plan is .5*800-100=300=300 so he will vote for it.

Points: 3
1 for each equation.

    d. Is this method suggested in part c equitable? Why or why not?
Answer:
I think this is equitable because both are better off before than after the plan.
On the other hand is is clearly unfair because this is a regressive tax and poor starving Aida is paying a much greater share of her income for the same service.

Points: 1 for explanation.

Part III: Short Answer Questions 3&4.

Please use one Blue Book to answer Q3 & Q4.
Q3. (**24 points**)

Due to the sluggish economy the government is concerned that employment will decrease and unemployment will increase. Specifically we will analyze the employment in the construction sector.

a. Draw a graph of the construction labor market. The labor market is perfectly competitive. Assume that the supply and demand curves for labor are linear and that the demand is downward sloping and supply upward sloping. Show the equilibrium wage (w*) and employment (L*). What is the level of unemployment at this time?

Answer:
Typical graph. No unemployment.

Points: 5
S & D; 1
L* & w*: 1 each
No unemployment: 2

b. The mortgage and credit crises have reduced demand for newly constructed houses. How will this effect the graph you drew in part a? How will this effect W*, L* and unemployment. Explain graphically.

Answer:
As demand for housing drops so does the price in the output market. As a result the demand for labor will shift in (rotation).
w**<w*, L**<L*, still no unemployment.

Points: 5
Demand rotation: 1 for shift + 1 for rotation.
w**, L** & no unemployment: 1 each.

c. If we find that more construction workers are unemployed than in part a, what may we assume about the change in wages?

Answer:

The change in wages was smaller than predicted. This could be due to wages being sticky, to minimum wage laws or to the wages being set by long term union contracts.

Points: 2
Wages did not adjust fully (no need for reason): 2 points

For the rest of the question assume that employment rather than unemployment is the concern.

President Bush suggests increasing employment among construction works by subsidizing their wages.

d. Democrats claim that this will have no effect on employment but will only benefit construction firms. What assumption (one and only one!) in part a must be false if the Democrats are correct? **Explain graphically**.

Answer:

We can model a subsidy as either a shift of the supply of labor out *or* as a shift of the demand for labor up.
Note that employment will not change if either the supply or the demand are completely inelastic, but the effect on workers vs. firms differs in each case.

If Democrats are correct and only the firms benefit it must be that wages *for the firms* drop. As the firms represent the demand side of the labor market this is consistent with an inelastic demand curve.
In this case we should graph the subsidy as a shift of the supply of labor out (or down by s). The wage to suppliers (workers) does not change, but wages to the demand side (firms) decreases by the full amount of the subsidy.

Note to students: this should look very familiar as it is the same question you got on midterm 1 SA2.

Points: 4
Demand completely inelastic: 2
Change in wages for firms: 1
No change in wages for workers: 1

e. Republicans agree that a wage subsidy will have no effect on employment, but say that the benefit will be only for the construction workers. What assumption (one and only one!) in part a must be false if the Republicans are correct? **Explain graphically**.

Answer:
If Republicans are correct and only the workers benefit it must be that wages *for*
the workers **rise. This is consistent with an inelastic supply curve as the workers**
are the supplier of labor.
In this case we should graph the subsidy as a shift of the demand for labor out
(or up by s). The wage to suppliers (workers) increases by the full subsidy, s, but
wages to the demand side (firms) does not change.
Points: 4
Supply completely inelastic: 2
No change in wages for firms: 1
Change in wages for workers: 1

f. Which of the cases in part d and e is more likely given our theory of labor demand
    & supply? Explain.

Answer:
It is more likely that supply is completely inelastic. This would be the case if the
substitution effect of higher wages is equal to the income effect.

Points: 4
2 for supply
2 for explanation using substitution & income effects.

   Students should also get full credit if they analyzed demand & supply
separately   **and argued why neither should be completely inelastic.**

Q4. (**6 points**)

    a. A local government offers you the following deal: you pay the government X dollars today and the government promises to pay you $10 a year from now. The interest rate r = 1%. What is the highest X you would be willing to pay the government?

Answer:
$NPV_a = 10/1.01 = 9.9$ so as long as $X_a < NPV_a = 9.9$ you are willing to take the offer.

Points: 2
Set up: 1 point
$X_a = 9.9$: 1 point

    b. Now suppose that the government offers you a second deal: you still pay the government X dollars but you receive $11 *two* years from now. Again, the interest rate r = 1%. Will X (the most you would be willing to pay the government) be higher or lower than in part a?

Answer:
$NPV_b = 11/1.01^2 = 10.78$ so as long as $X_b < NPV_b = 10.78$ you are willing to take the offer.
This is bigger than the amount in part a.

Points:2
Set up: 1 point
$X_b = 10.78$: 0.5 points
$X_a < X_b$: .5 point

    c. How does you answer to part b depend on the interest rate? Explain algebraically.

Answer:
$X_a = 10/(1+r)$ and $X_b = 11/(1+r)^2$
Let's solve for when $X_a > X_b$:
$10/(1+r) > 11/(1+r)^2$ ➔
$10 > 11/(1+r)$ ➔
$(1+r) > 11/10$ ➔
$r > 1/10$ ➔ $r > .1$
So $X_a > X_b$ iff r>.1 or 10%.

(You can check this by plugging r=10% and seeing that $X_a = X_b = 9.09$ in this case).

Points:2
1 for set up, 1 for solution.
1 point if argued correctly but did not solve algebraically.