Econ 001: Final Exam (Dr. Stein)
May 7th, 2009

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 12 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 (3 points each/36 points total):

1. Steve has planned to attend a conference next week in Mexico City. He has already purchased a nonrefundable plane ticket for $300. His all inclusive hotel room would cost him a total of $500 and has not yet been paid. Unfortunately Steve is having second thoughts about going to Mexico because he is afraid of contracting the Swine Flu. Were he to go to Mexico, Steve would quantify his fear as the equivalent of $100. Steve has no alternative use of his time. What is Steve's opportunity cost of going to Mexico?

a. $0
b. $100
c. $500
d. $600
e. $900

2. The Economic Stimulus package that was passed in February included large investment projects in infrastructure (e.g., roads, railways, bridges). The goals of this package are:

a. To shift the economy from inside the PPF to onto the current PPF curve.
b. To shift out the economy's PPF curve for future years.
c. Both a & b are correct.
d. Neither is correct.

3. At the Greek Lady there are 3 workers, Tom, Dick and Harry, who can make salads and gyros. Tom, Dick and Harry can respectively make a maximum of 200, 300 and 400 salads in a day. Further, their opportunity cost of making a gyro (expressed in terms of salads) is respectively 2, 3 and 4. The following table sums up this information

	Tom	Dick	Harry
Maximum amount of salads possible to produce in a day	200	300	400
Opportunity cost of producing a gyro (in terms of salads)	2	3	4

Comparing Tom & Harry to each other we know that:

a. Tom has an absolute advantage in making gyros.
b. Tom has a comparative advantage in making gyros.
c. Neither a nor b is true
d. Both a & b are true.

4. Using the information from the question above. Suppose a new possibility opens up for the Greek Lady. It can trade with Allegro Pizza. It is determined that the price of a gyro (in terms of salad) is 5 salads. Which of the following statements is true?

I. It will be in the interest of the Greek Lady to trade with Allegro pizza at the prevailing prices.
II. With trade, The Greek Lady will produce zero salads.

a. I is correct.
b. II is correct.
c. Both I and II are correct.
d. Neither I nor b is correct.

5. You noticed on your most recent trip to the supermarket that Fresh Grocer brand olive oil is less expensive than on your previous visit. This surprises you because you had read recently how storms in Spain destroyed much of its olive crop. Which of the following is **not** a possible explanation?

a. The current recession has depressed wages for olive harvesters.
b. Olive oil is a normal good, and incomes have decreased due to the recession.
c. There have been recent technological improvements in harvesting olives.
d. Demand for olive oil is perfectly inelastic.
e. None of the above.

6. Consider the market for pencil erasers, which is perfectly competitive and characterized by the following cost structure:
$MC=4q+4$
$VC=2q^2 + 4q$

All we know about fixed costs is that they are greater than zero. The current market price is $16. Which of the following statements is true?

a. The firm would prefer to shut down than produce at any positive quantity.
b. If fixed costs are sufficiently high, this firm will shut down in the short run.
c. The firm will make positive profits in the short run if fixed costs are less than $18.
d. Given this information, we can calculate the long-run market price of pencil erasers.
e. None of the above.

7. Using the information from the previous question, if the fixed cost of production is $128 then the long run price will be:
a. $8
b. $16
c. $36
d. None of the above.

8. Consider the standard labor-leisure model from class. Suppose that wages go down and we observe that time spent on leisure activities decreases. This implies that

a. the substitution effect dominated the income effect
b. the income effect dominated the substitution effect
c. leisure is a normal good
d. labor supply will be upward sloping
e. both (a) and (c) are correct
f. both (c) and (d) are correct
g. both (b) and (c) are correct
h. both (b) and (d) are correct

9. The market for apples is perfectly competitive and is in long-run equilibrium. The price of fertilizer, a variable input used in apple growing, falls. Which of the following is true of the price of apples?

a. In the short run prices will rise, then return to their previous level in the long run.
b. In the short run prices will fall, then return to their previous level in the long run.
c. In the long run prices will rise.
d. In the long run prices will fall.

10. Emily argues that the market for Swine Flu vaccines is monopolistically competitive. Which of the following statements would **contradict** her claim?

a. Swine Flu vaccines are sold with a mark up over their marginal cost of production.
b. Merck, a producer of Swine Flu vaccine, made economic profits from the sale of the vaccine last year.
c. All Swine flu vaccines are essentially the same.
d. Most factories used to produce Swine Flu vaccine are idle over the weekend.
e. Merck's investors predict that, in the long run, Merck will make zero economic profits from the sale of the Swine Flu vaccine.

11. Two hunters decide to go out hunting. They both have to choose to hunt either a stag or a hare. The stag is more valuable, but both hunters must go after it in order for the stag to be caught. This can be modeled in the following game:

		Hunter 2	
		Hunt a Stag	Hunt a Hare
Hunter 1	Hunt a Stag	Hunter 1:10 Hunter 2:10	Hunter 1:0 Hunter 2:5
	Hunt a Hare	Hunter 1:5 Hunter 2:0	Hunter 1:5 Hunter 2:5

Which of the following is **false**?

a. This game has 2 Nash Equilibria.
b. They will never hunt the stag.
c. Society is best off if they both hunt the stag.
d. There is no dominant strategy in this game.

12. The new government budget proposes an increase in the marginal tax rate for incomes over $250,000. This will:

I. Make taxes more progressive.
II. Lower the (after tax) Gini ratio.

a. Only I is correct.
b. Only II is correct.
c. Both I and II are correct.
d. Neither is correct.

Answer Key:

1. We will accept both c and d. The correct answer is c.
2. c
3. b
4. c
5. d
6. c
7. c
8. g
9. d
10. c
11. b
12. c

Part II: Short Answer Questions 1&2.

Please use one Blue Book to answer Q1 & Q2.

Q1. (**22 points)**
"Let there be no doubt- the future belongs to the nation that best educates its citizens – and my fellow Americans, we have everything we need to be that nation." (President Barack Obama in an address to the Hispanic Chamber of Commerce, March 10, 2009).

We will analyze this statement looking at the market of widgets.

Suppose that the supply of labor of widget makers is give by: w=100+10L, where L is the number of workers and w is the weekly wage.

a. Using this information can we tell if leisure is a normal good? Explain carefully.

Answer:
Supply of labor is upward sloping; this is consistent with 2 cases (i) leisure being a normal good and the income effect being smaller than the substitution affect OR (ii) leisure being an inferior good. So we can not tell for sure that leisure is a normal good.

Points: 2
Points for explaining that S upward sloping even if leisure inferior: 2

Suppose that the marginal productivity of workers is given by MP(L)=20-L, where L is the number of workers. Suppose further that each widget sells at a competitive market price of $20

b. What is the demand for labor in this case? Why is it downward sloping?

Answer:
Firms will hire workers up to w=MRP=MP(l)*P=(20-L)20=400-20L
Demand is downward sloping because MP(l) is diminishing due to the law of diminishing marginal productivity.

Points: 2
w=MRP=MP(l)*P=(20-L)20=400-20L: 2 (1 set up, 1 answer)
Law of diminishing marginal productivity: 2

c. What is the equilibrium level of employment, unemployment? What is the equilibrium wage rate?

Answer:
In equilibrium 100+10L=400-20L or L=10 and w=200.
Unemployment is zero.

Points: 3
L=10:1
Unemployment zero:1
Wages=200:1

d. If a typical worker worked for 50 weeks a year what would his annual income be? If he lived alone, would he be considered poor? Explain why or why not. (Note: you may explain how to answer this question even if you do not remember the exact answer).

Answer:
Annual income=50*200=10,000. This is below the poverty threshold for an individual living alone and he will be counted as 'poor'.

Points: 2
Annual income: 1
Comparing to poverty threshold: 1 (even if didn't remember that 10K is below it).

In an effort to increase incomes, the Center for Poverty & Compassion suggests setting a minimum wage of $260 a week.

e. What will the effect of this policy on employment, unemployment?

Answer:
The quantity demanded of labor can be found from 260=400-20L or L_d=7
The quantity supplied of labor can be found from 260=100+10L or L_d=16
The level of employment will be the lower of these, or L=7.
Unemployment will be 16-7=9.

Points: 3
L=7: 2 (1 for set up, 1 for answer)
Unemployment=9: 1 (1/2 for set up, 1/2 for answer

f. Is this an effective policy to reduce poverty?

Answer:
Those who are working will now earn 260*50=13000 a year which is above the poverty thresholds, therefore poverty rate will be reduced, even though unemployment increases.

Points:2
Those working earn more:1
But unemployment increases:1

Assume that a minimum wage is NOT set.

President Obama calls instead for improving education. Suppose education would increase worker productivity. Specifically, suppose each worker's marginal productivity increases by 15 widgets. Assume the price of widgets stays at $20.

g. What will the effect of this policy on employment, unemployment and wages?

Answer:
Now MP(l)=(20-L)+15=35-L
So that demand for labor is given by w=MRP=MP(l)*P=(35-L)20=700-20L
Setting D=S we get 700-20L=100+10L or L=20 and w=300.
Unemployment is zero.

Points: 5
Set up of demand for labor:2
L=20: 1
W=300: 1
Unemployment zero:1
Note: a graphical explanation will earn 3 points.

h. Is this an effective policy to reduce poverty?

Answer:
Yes. Now 20 people who earned less than the poverty threshold now earn more.

Points:1 for relating income to poverty threshold.

Q2. (10 points)
Full credit will be given for set up and explanation, even if there is a numerical error in the calculation. If you need to make clarifying assumptions please do so.

The recent recession has caused cutbacks in many government services. Among these are hospitals and, in particular, public health workers, who help deal with crises in public health. Thousands of workers were laid off in this field. We shall analyze this decision from the perspective of a single, isolated town, Swineville.

a. If the public health workers cost Swineville $300,000 each year, what is the net present value (PV of their cost) of hiring them on a three year contract, assuming a 10% interest rate.

Answer:
PV=300,000+300,000/1.1+300,000/1.21=820,661

Points: 2

Obviously, there is a reason they are hired in the first place: they help prevent the outbreak of disease. Local businesses have calculated that swine flu would cost the city $900,000 more if public health officials are not present than if they are.

Assume that public health workers can only be hired on a three year contract and that the flu will occur, at most, once.

b. If the disease were to occur in the first year, should the town hire the health workers?

Answer:
NPV=-(300,000+300,000/1.1+300,000/1.21)+900,000>zero
So hiring the health workers is good investment.
Points: 2
Comparing cost to benefit:1
Conclusion: 1

c. If the disease were to occur in the second year, should the town hire the health workers? If the disease were to occur in the third year, should the town hire the health workers?

Answer:
If the disease was in the second year:
NPV=-(300,000+300,000/1.1+300,000/1.21)+900,000/1.1<zero
So hiring the health workers is not a good investment.

If the disease was in the third year:
NPV=-(300,000+300,000/1.1+300,000/1.21)+900,000/1.21<zero
So hiring the health workers is not a good investment.

Points: 3
Discounting benefit in 2 years correctly:1
Discounting benefit in 3 years correctly:1
Comparing cost & benefit:1

d. Who should pay for the health care workers, businesses or households? What criteria are you using to answer this question?

Answer:
From an efficiency standpoint as long as NPV>zero the workers should be hired irrespective of who pays for their services.
From an equity standpoint it is fair that all share the burden. Or maybe that the only the frail pay the costs as they are the most likely to be harmed by the flu. Or maybe that Bill Gates should pay for everyone- why not?

Points: 3
Full credit needs reference to efficiency and equity: 1 each.
Understanding that for efficiency who pays doesn't matter: 1

Part III: Short Answer Questions 3&4.
Please use one Blue Book to answer Q3 & Q4.

Q3. (20 points)
Full credit requires numerical solution, but generous partial credit will be given for correct graphical answers. Please label graphs clearly.

Utility services like electricity typically have high fixed costs, and low marginal costs. Assume that the marginal cost of producing electricity is given by the equation:

$$MC(Q) = 5,$$

where Q refers to the quantity of electricity.

a. How many firms would you expect to operate in this industry in the long run? What is such a market structure called?

Answer:
In the long run we should expect only one firm to operate. This is a Natural Monopoly.

Points: 2
1 firm: 1
Natural monopoly:1

Suppose the demand for electricity is given by D=35-Q, so that MR=35-2Q.

b. Show graphically & numerically, the level of output that a firm operating in this market structure produces. Clearly mark out in your graph the profits that such a firm makes. Assume no regulation.

Answer:
The firm will produce where MR=MC or 35-2Q=5 Q=15.
Profits are the area bounded by P, ATC & Q=15.

Points: 3
Q=15: 2 (1 for graph, 1 for numerical answer)
Profit graphed correctly: 1 (no partial credit)

c. Show graphically & numerically, the total surplus generated in this market. Is there Dead Weight Loss? If so, mark it on your graph.

Answer:
The T.S. is the trapezoid bounded by demand & MC up to Q=15. Or ((35-5)+(20-5))*15/2=337.5*).
The Dead Weight Loss is the area bounded by D & MC from Q=15 to Q=30.

Points: 3
T.S.: 2 (1 numeric, 1 graph). Finding consumer surplus earns 0 out of these 2 points.
DWL: 1 (graph only)

Now assume that each unit of electricity causes pollution equivalent to $20.

d. What is the efficient level of production?

Answer:
The efficient level of production is where SMC=SMB. SMC=5+20=25.
Setting 25=35-Q we get Q^{eff}=10.

Points: 3
SMC=20 +5: 1
SMC=MB: 1
Q=10: 1

e. Can a per unit tax at the size of the externality ($20) achieve efficiency? Show your calculations

Answer:
No. We a tax of $20 per unit the firm will face a MC of 25. Setting MC=MR they will produce 25=35-2Q or Q=5 which is lower than the efficient level found in part d.

Points:2
Need to show that t=$20 generates inefficient outcome.
An answer of simply yes or no earns zero points, though if students refer back to this part *after* answering part f they may be able to get these points.

f. Suggest a taxation policy intervention in which the monopoly is producing the efficient level of production.

Answer:
We need a tax t such that PMC=MR at Q=10.
So t must solve: 5+t=35-2*10 or t=10.

Points: 3
2 for set up
1 for solution.

g. Environmentalist groups suggest that the harm to the environment is long lasting, not only does it cause immediate harm of $20, but it causes harm of $20 next period as well. Suppose the interest rate is 10%, what is the size of the externality? What can you say about the SMC curve compared to the private MC?

Answer:
The externality in this case will be 20+20/1.1=38.18
The SMC is higher by 38.18 than the MC.

Points: 2
Set up of discounting: 1
SMC>MC:1

h. Can we achieve efficiency by imposing the per-unit tax you calculated in part f? Explain.

Answer:
The tax found in part f would correct only for an externality of $20 per unit, if the externality is larger, the tax would need to be larger too. Note that in this case the externality is so large that the efficient consumption is zero so that tax must deter any production.

Points: 2
Can answer in any of these ways:
1. **Intuition that the tax must be large because the externality is lrger.**
2. **Showing numerically or graphically that Q^{eff}=zero.**

Q4. (**12 points)**
The following two cartoons appeared recently in the New York Times. Both are commenting about the role of the government. This question asks you to analyze why they are funny.

a. What are the characteristics of a pure public good?

Answer:
Non rival & non-excludable.

Points: 2 (1 each).

b. Why should the government provide such goods? Explain very carefully.

Answer:
A non excludable good will suffer from free riding and thus under provision. A non-rival good has MC=zero and is an extreme case of a natural monopoly. To provide the efficient quantity price must be set at zero, which will deter any private firm from providing it.
Either way the market will not provide the efficient output.

Points: 4
For non excludability must mention free riding.
For non rival must explain why private firm cannot provide efficient Q.

c. Using this reasoning should the government produce cars? Why or why not.

Answer: 2
No. Cars are both excludable & rival and the competitive market will provide their efficient level.

Points: 1 each.

d. Using this reasoning should the government have the power to collect taxes to provide for anti-pirating measures? Why or why not.

Answer: 2
Yes. Anti-pirating measure are both non-excludable & non-rival, therefore competitive market will NOT provide their efficient level and there is good reason for the government to step in and provide these goods.

Points: 1 each.

e. Do you think these cartoons are funny? (no need to explain).

Answer: Of course! Would I share them otherwise? 2 point for any answer.