Econ 001: Final Exam (Dr. Stein) **Answer Key**
December 21, 2010

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.**
- Calculators are not allowed on this exam.

Check: The Exam has 4 parts. You will need 4 blue books.
Part I consists of 20 multiple-choice questions. Please write you answers in bluebook 1.
Part II consists of 1 short answer question. Please use bluebook 2 for Q1.
Part III consists of 1 short answer question. Please use bluebook 2 for Q2.
Part IV consists of 1 short answer questions. Please use bluebook 3 for Q3.

Failure to follow these directions will mean that your exam will not be graded until after the winter break.

Part I: Multiple Choice Questions (2 points each/40 points total).
Please write your answers in blue book 1.

1. Students can attend GREAT meetings on Sundays or Mondays. There is no additional charge for these sessions. Which of these statements is true?

    a. Attendance is free in terms of economic costs.
    b. Students should be indifferent between the two days as they pay zero dollars on both.
    c. Both above statements are true.
    d. None of the above is true.

2. The following table compares **total** wheat and computer production in India and Israel (in millions of units).

	India	Israel
Wheat (total per day)	900	500
Computers (total per day)	9	1

Note: Suppose India has 1000 times more workers than Israel.
Which of these statements is true?

I. Israel has a comparative advantage in wheat production.
II. If India & Israel trade, Israel would produce only Wheat & India only Computers.

a. Both are True.
b. Only I is True
c. Only II is True
d. Both are False

3. In a certain economy, peanuts and books are produced, and the economy currently operates on its production possibilities frontier. Which of the following events would allow the economy to produce more peanuts and more books, relative to the quantities of those goods that are being produced now?

a. Unemployed labor is put to work producing peanuts and books.
b. The economy puts its idle capital to work producing peanuts and books.
c. The economy experiences technology improvement.
d. All of the above are correct.

4. Suppose a country is producing on its Production Possibilities Frontier but at a point where MB>MC. This implies that the country is:

I. Efficient in terms of production.
II. Efficient in terms of allocation
III. Creates Dead Weight Loss

a. only I is correct
b. only II is correct
c. only III is correct
d. All three are correct.
e. Both I & II but not III
f. Both II & III but not I
g. Both I & III but not II

h. All are false

5. Suppose the demand elasticity for HP laptops is exactly one and now the government imposes a tax of $100 for each laptop. Which of the following is true?

a. The revenue of HP (net of taxes) doesn't change with the tax.
b. The revenue of HP (net of taxes) decreases with the tax.
c. The revenue of HP (net of taxes) increases with the tax.
d. There is no DWL.

6. The Bourse movie theater is expecting many empty seats on the next showing of "Freakonomcs, the Movie." Nonetheless they are thinking of responding by raising ticket prices with the hope that this will increase revenues. This strategy will work if:

a. Demand is elastic.
b. Demand is inelastic.
c. Demand is unit elastic.
d. Demand is perfectly elastic.

7. Buyers of a good bear the larger share of the tax burden when a tax is placed on a product for which
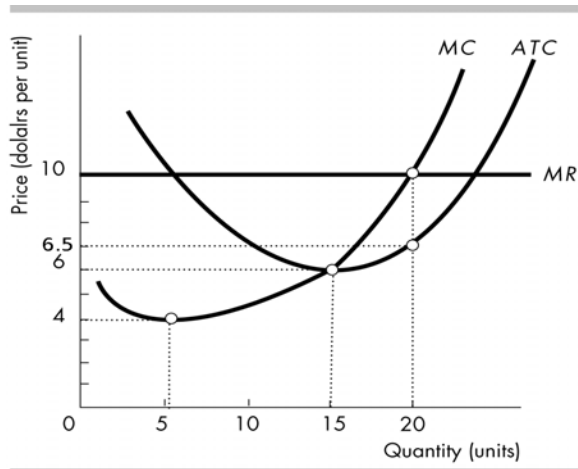
a. the supply is more elastic than the demand.
b. the demand is more elastic than the supply.
c. the tax is placed on the sellers of the product.
d. the tax is placed on the buyers of the product.

8. Suppose that demand for sugar is downward sloping & the supply upward sloping. Suppose further that there are no externalities in this market. If the government removes existing subsidies on sugar this will:

I. Increase Consumer Surplus.
II. Increase Producer Surplus.
III. Increase Total Surplus.

i. only I is correct
j. only II is correct
k. only III is correct
l. All three are correct.
m. Both I & II but not III
n. Both II & III but not I
o. Both I & III but not II
p. None are correct.

9. The following two questions refer to the following graph of the costs facing a wheat farmer in a perfectly competitive market:

which of the following is <u>false</u>?

    a. In a long run equilibrium P = 6 and q = 15
    b. At P = 6 and q = 15 the firm would make zero profits.
    c. In the short run, the firm is making profits of $70.
    d. In the long run, MR will increase.

10. In long run equilibrium, assume there are 40 firms in the industry. Now, due to the popularity of the low-carb diet, demand for wheat has fallen, driving the price down to $4. What is the quantity demanded by the market in the short run?

    a. 5
    b. 40
    c. 160
    d. 200

11. When the ATC curve is increasing,

    I. AVC is increasing
    II. ATC is greater than MC

Which of the above statements is **true**?
    a. I only
    b. II only
    c. Both I and II
    d. Neither I nor II

12. We learn that between P=$1 and P=$2 the demand for chewing gum is perfectly inelastic. Which of the following statements must be true between these prices

     I. Chewing gum is a normal good.
    II. The income effect is equal to the substitution effect.

  a. Only I.
  b. Only II.
  c. Both I and II.
  d. Neither I nor II.

13. A company faces the following marginal cost curve: MC=10
What kind of market model would you use to analyze this case?

  a. perfect competition
  b. natural monopoly
  c. monopolistic competition
  d. Either model would work as long as the fixed costs were small.

14. A company selling baseball caps has the following revenue and marginal cost:

q	1	2	3	4	5
Revenue	4	8	12	16	20
MC	2	3	4	7	8

Using this information, we may assume the company:

    I. produces in a perfectly competitive market
    II. produces with a technology exhibiting diminishing marginal productivity

  a. only I
  b. only II
  c. Both I and II
  d. Neither I nor II

15. Using the information from the question above, how many baseball caps will this firm sell (please assume there are no fixed costs)?

  a. 2
  b. 3
  c. 4
  d. 5

e. The answer depends on the price

16. Using the following 2x2 matrix:

Player 1

	C	D
C	Player 1: 10 Player 2: 10	Player 1: 0 Player 2: 9
D	Player 1: 9 Player 2: 0	Player 1: 5 Player 2: 5

I.   (C,C) is a Nash equilibrium
II. (D,D) is Nash equilibrium

Which of the above statements is **false**?

a. I only
b. II only
c. Both I and II
d. Neither I nor II

17. Which of the following hold for both the monopolistic competition model and perfect competition?

a. In the long run firms make zero profits.
b. Both produce at a quantity at which price exceeds marginal cost.
c. Both firms produce where MC = MR.
d. In the long run, both types of firms have excess capacity.
e. a and b
f. a and c
g. a and d
h. a, b & c
i. a, b, c, and d

18. A tax bill recently put forth in the U.S. Congress would extend the Bush tax cuts for all income levels (call this version bill A). President Obama had originally hoped to extend the Bush tax cuts for individuals making less than $250,000 per year but to repeal the tax cuts for individuals making more than $250,000 per year (call this version bill B).

Relative to bill A we can say,

a. bill B makes the tax code more regressive and decreases the Gini coefficient.
b. bill B makes the tax code more progressive and decreases the Gini coefficient.
c. bill B makes the tax code more regressive and increases the Gini coefficient.
d. bill B makes the tax code more progressive and increases the Gini coefficient.

19. Which of the following statements is correct?

a. If a good is excludable and non rival, the production is inefficient because of a free riding problem.
b. If a good is excludable and rival, the production is inefficient because of a free riding problem.
c. If a good is non excludable and rival, production is inefficient because of a free riding problem.
d. both (a) and (b)
e. both (a) and (c)
f. none.

20. The Thompson family consists of 4 people living together. The household income in 2010 is $27,000. Will they be counted as living in poverty?

a. Only the children will be counted as living in poverty.
b. Only the adults will be counted as living in poverty.
c. Children will count as living in poverty only if they are related to the adults living in the household.
d. Everyone but the elderly (over 65) will be counted as living in poverty.
e. None of the Thompson family will count as living in poverty.

Answer Key:
1. d
2. b
3. c
4. g
5. b
6. b
7. a
8. k (accept c)
9. d
10. d
11. a
12. b
13. credit for all answers
14. c
16. b
16. d
17. f
18. b
19. c
20. e

Note to future students: This was an unusually long and tough final exam.

Part II: Please answer in blue book 2. Q1. (24 points)
Dillon, Texas has only one hospital, Panther General, which implies that nurses their only have one potential employer. This question asks you to analyze what would happen if new hospitals entered this market in terms of the impact on the labor market. Throughout the question we will assume that the revenue per patient day in the hospital is set by Medicare at $500.
The marginal productivity of nurses (in terms of patient days) is given by
$MP(\ell) = 1 - 0.02\ell$.

Assume the labor supply is: $w = L+20$. So the Marginal cost of labor is: $MC = 2L+20$

a. Do nurses consider leisure to be a normal good? Explain.

b. Find the function for the labor demand of Panther General. (Hint: MRP as a function of L)

c. What type of labor market is this?

d. Draw a graph of this labor market. What is the wage and level of employment in this case?

e. Is there unemployment? Is the outcome efficient? Explain.

f. What are the total revenue, total cost of labor, and the profits for the hospital? Assume there is no other cost than labor. (If you can't find the numerical answer, mark them on the graph to get partial credit.)

Realizing the great profit of this business, new hospitals are likely to enter this market. The price per patient day and the MP of workers will not change, but the labor market will become competitive.

g. Show <u>graphically</u> the equilibrium wage and employment for nurses in Dillon.

h. Will nurses become better off or worse off? What happens to the aggregate profit of the hospitals. Explain graphically or numerically (either one will earn full credit).

The Nursing Union is trying to unionize the nurses in Dillon, Texas. The local Union leader, Smash Williams, states: "A union will bargain for higher wages than the hospital would otherwise pay. This will benefit the nurses not only by raising wages but also by reducing unemployment. Moreover, with the higher wages, more patient will be treated than before".

    i.   Do you agree with this statement? Does it depend on how many hospitals are active in the market? Explain your answer in each case *carefully*.

a. The supply of labor is upward sloping. This could be because leisure is an inferior good or because leisure is a normal good and the substitution effect dominates the income effect.

Points: 2
Inferior good:1
Normal but Sub effect dominates:1

b. MRP = 500*(1 – 0.02L) = 500 - 10L

Points:2
c. Only one employer for nurses => the hospital is a monopsonist.

Points: 2 for the term monpsony/monopsonist
d. Graph with MRP, MC, and labor supply. Level of employment determined by MRP=MC(L)➔
500 – 10L = 2L + 20 so that L$_m$ = 40
wage comes from the supply curve so w$_m$ = L + 20 = 40 + 20 = 60

Points: 4
Graph: 2, need to have MC(L) above S curve.
Setting L by MRP=MC(L): 1
Wages: 1 (1/2 for method, 1/2 for answer)

e. No unemployment as all workers supplying their labor at this wage rate are hired. The outcome is not efficient. MRP > Labor Supply at this quantity of labor hence there are workers who would supply their labor at wages below their MRP.

Points:2
No unemployment: 1 (for explanation)
Inefficient: 1 (for explanation, can be graphical)

f. Total cost of labor = 60*40 = 2,400

Total Revenue is given by the trapezoid under the MRP curve over to the quantity of labor actually hired, hence
Total Revenue = 0.5*(500+100)*40 = 12,000
Profits = 12,000 – 2,400 = 9,600

Points: 3. 1 each.

g. Competitive eqbm found as the point where MRP=S (L) or 500 – 10L = L + 20. L* higher and W* higher.

Points: 3
MRP=S (L):1
L higher:1
W higher: 1
(indicated on graph is fine)

h. More nurses hired and at a higher wage. Aggregate profits will necessarily go down since MCL > MRP at this point (and hence costs are increasing faster than revenues from the additional output).

Points: 2 (for explanation!)
Nurses better off: 1
Firms worse off: 1
i. With monopsony: The union could set wages=W*>Wm increasing both wages & employment. Note that unemployment is zero in any case so it will NOT reduce unemployment. As more nurses are being hired it must be that more patients are being served.

In the market is competitive though, the union will set wages=W^U>W* increasing wages but <u>causing</u> employment. In this case the firm will hire fewer nurses which implies that fewer patients are being served.

Points: 4
Monopsony case: wages increase to W*➔ unemployment at zero, more patients : 1 each
Competitive case: wages increase above W*➔unemployment, fewer patients : 1 each

Part III: Please answer in blue book 2.
Q2. (24 points)
Currently, there is no sales tax on food in Pennsylvania. In this question, we will analyze the effect of introducing such a tax on a specific share of this market, specifically on meat products.

To make the analysis consistent with the model learned in class, we will assume that the sales tax is a per unit tax.

    a. Let us start with the current state of no tax. Draw a graph with typical supply and demand curves for meat products. Suppose the equilibrium price of meat, for consumers, is $2 per unit. Add this to your graph. What are the consumer's surplus, producer's surplus and total surplus? Shade the areas on your graph (no calculations needed).

Suppose now the state government decides to charge a 50 cents per unit sales tax on meat (imposed on producers).

    b. Draw a new graph with the tax. Show graphically the new equilibrium price that consumers pay and quantity they purchase.

    c. What are the consumer's surplus, producer's surplus, total surplus & dead weight loss now? Shade them or clearly mark them on your graph in part b.

    d. Given your answer to part c, would you support a tax on meat? Explain.

President Bill Clinton recently confirmed in an interview with journalist Willow Bay that since early May he is indeed eating a mainly vegan diet. In the interview, the former president explains that, "Since 1986, several hundred people who have tried essentially a plant-based diet, not ingesting any cholesterol from any source, have seen their bodies start to heal themselves — break up the arterial blockage, break up the calcium deposits around the heart. 82 percent of the people who have done this have had this result, so I want to see if I can be one of them."

Moran, an econ-001 TA, suggests that these remarks support putting a tax on meat. She says: "when people are sick they impose a cost on society at large that they do not take into account when making eating choices."

    e. What term would we use to describe this?
    f. Suppose the cost on society is 50 cents per pound of meat, how would this change your answer to parts c & d? Use a new graph to explain.

Sarah Palin, a popular Tea Party figure and a Fox news commentator, is fiercely opposing the tax on meat. She says, "This tax is un-American. The American people love meat, we

will never agree to drop our hamburgers off our plates. Taxing meat will do nothing but make our meat more expensive."

      g. What does Mrs. Palin assume about the meat market? Show graphically. In this case does taxing meat make sense? (Clarification: Please continue to assume that Moran's statement above was correct.)

      h. Do you think Mrs. Palin's assertion is correct? Explain why or why not. Credit depends on explanation.

a. Usual picture with supply and demand intersecting at $2.
Points: 4
Eqbm at 2:1
C.S., P.S. & T.S.:1 each

b. Supply curve now shifts up by $0.50 at every quantity. Eqbm price consumers pay between 2 and 2.50. lower quantity purchased
Points: 2
1 each. Price must be between 2 & 2.50.

c. Points: 4
C.S., P.S. & T.S. (with tax revenue) & DWL:1 each

d. The tax on meat unequivocally reduces the total surplus, hence I would not support it.
Points: 2

e. Points: 2
Negative externality

f. C.S., P.S. & tax revenue as before. But T.S. must include externality. No DWL. Tax internalizes externality and reduces DWL so it is efficient.

Points:6
C.S., P.S.: 1 each
T.S. (with tax revenue, minus externality) : 2 point
No DWL: 1 point
Tax internalizes externality and reduces DWL so it is efficient. : 2 points
g. Assumes that demand is perfectly inelastic. Taxing meat is then unnecessary since the original quantity was efficient (even with the externality).
Points:2
Demand perfectly inelastic:1
In this case no DWL despite externalioty:1
h. In reality the demand for meat is probably not perfectly inelastic, if meat becomes expensive consumers will switch a variety of plant-based substitutes for protein (soy products etc.)   Points: 2

Part IV: Short Answer Questions 3. Please answer in blue book 3.
Q3. (12 points)
Several years ago, China started to build a high-speed railway between Beijing and Shanghai, which are the two largest cities in China. The following statement is from Yahoo! News.

"…The project costs $32.5 billion and is part of a massive government effort to link many of China's cities by high-speed rail and reduce overcrowding on heavily used lines. …The line is due to open in 2012 and will halve the current travel time between the capital Beijing and Shanghai to five hours. "

Assume (for simplicity of working through the problem) that the whole high-speed rail project costs $3250. Assume also that a total of 10 people live in the two cities above (so each person in the problem represents around 100 million in the real world). Assume that all of the people have the same income of $1000.

Half of the 10 people are frequent travelers & half infrequent. Suppose that after the line is open in 2012 and halves the travel time, each passenger will get $60 more benefit <u>per round trip</u> between Beijing and Shanghai.

In addition, the National Railway Company is in charge of the operation of all the railways in China, including setting the prices. Note that for the high-speed railway the <u>marginal cost</u> for each passenger <u>is the same</u> as the current railway.

Now use your knowledge about public goods to answer the following questions.

a. Each frequent traveler expects to travel 10 round trips by train between Beijing and Shanghai in his life, and the infrequent traveler expects only 1 round trip. Is it efficient to build this high-speed railway?

   b. Each passenger earns $1000. What is the lowest proportional income tax rate to fund this high-speed rail? Is this tax scheme equitable? To implement such a tax and continue the goal of enhancing a harmonious society, all people living in the cities would need to support it. Will the government get their support in this case? Explain.

   c. It is expected that the price of high-speed train for a round trip to be $150 in 2012, and the current price (without the high-speed rail) is $120 for a round trip. With these prices, what would the proportional tax rate need to be to fund the high speed rail? Will the people support the tax scheme in this case? Show your calculation.

   d. Is there a ticket price that would eliminate the need to fund the high speed rail without an additional tax? If so, what is it? Would the people agree to this price?

e. Charles R., a distinguished scholar at the CATO institute, claims: "though the high speed rail project would be efficient, it does not need to be funded through the tax system. The Private Market will do a perfectly good job providing this good." Given the information above do you agree?

f. Xianting, an econ-001 TA, agrees stating: "this high speed rail system is not a public good at all. Including it in this exam is simply confusing the students." Do you agree?

Answer Key:
a. TC = $3250
benefit to a frequent traveler = 60*10 *5= 3000
benefit to an infrequent traveler = 60*1*5 = 300
Total benefit = 3300
TB > TC so it is efficient to build
1 point awarded as long as the student knows to compare SMC an SMB (even if the calculations are wrong).
Points: 3

b. With 10 people each needs to pay 3250/10=325 in taxes. With an income of $1000 each this is a tax rate of 32.5%.
The frequent travelers will support this tax as their benefit from the system is 10*60=600.
The infrequent travelers will NOT support this tax as their benefit from the system is 1*60=60.

Points: 2
c. The amount funded by tickets revenues will be $30 per trip.
Frequent travelers will use 10 trips each or 50 trips total for $1500.
Infrequent travelers will use 1 trip each or 5 trips total for $150.
Together: $1650 is funded through tickets.
This leaves 3250-1650=1600 to be funded through a tax.
With 10 people this will be $160 per person.

Once again only the frequent travelers will support this tax.
Give full credit for simple arithmetic mistakes, full credit given as long as the setup is correct.
2 points.

d. Suppose we set P=60. As each passenger will get $60 more benefit <u>per round trip</u> between Beijing and Shanghai they will be willing to pay this price. At $60 a ticket we get revenues of:
60*10*5=3000 from frequent travelers
60*1*5=300 from infrequent travelers
3300>3250 and the project can be funded.
Full credit as long as the student set things up in a way that would work, for example many students only wrote 3250/55 = P. Really they mean 120 + 3250/55 but full credit was given for either of those answers.
2 points.

e. Points; parts e & f can be graded together. Looking for terminology. Need to use the terms excludable, rival, natural monopoly & free riding: 1 each for a max of 3
Yes! See my answer to d. Grading was generous here, 1 point deduction though if the student does not at least recognize that the trains are an excludable good.

Points 3 total for both e and f combined.

f. Xianting is correct. Train raiding is an <u>excludable good</u> so there is no issue of free riding. It may be a natural monopoly if non rival, but that is not clear from this question.

You are done! Have a great break!