Econ 001: Final Exam (Dr. Stein)
December 16th, 2011

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.

The Exam has 3 parts. You will need 3 blue books. One for each part.

Part I:
Multiple Choice Questions (3 points each/42 points total).
Please write your answers in blue book 1.

1. In Munich, Germany there is an annual celebration called Oktoberfest. There are three workers who produce pretzels and cider as follows:

	Pretzels (units per day)	Cider (units per day)
Kyle	20	10
Jake	40	40
Dan	30	45

Suppose that the three are producing together 10 pretzels efficiently, how much cider will they be producing?

    a. less then 90 units of cider
    b. 90 units of cider
    c. 95 units of cider
    d. 100 units of cider
    e. 105 units of cider
    f. more then 105 units of cider

2. Using the table above. The price of cider in Germany is ½ pretzel and the group may trade with other workers at this price. Dan is pleased by this trade and says "Now we can have more pretzels than before without reducing our consumption of cider". Is he correct?

   a. The maximum amount of pretzels they can consume has not change.
   b. Compared to the point found in Q1, they can indeed consume more pretzels without reducing the amount of cider.
   c. Both a and b are correct.
   d. Neither a or b is correct.

3. An analyst believed that after the financial crisis in 2008, we have had a huge excess supply in the U.S. housing market and he predicted that, in the next 5 years, the housing market will approach a new equilibrium through price adjustment. According to his prediction, what might be observed in the next 5 years?

   a. A decrease in demand.
   b. An increase in quantity demanded.
   c. A decrease in quantity demanded.
   d. An increase in demand.

4. If Penn Dining decreases the price of their freshmen dining plans and notices a decrease in total revenue, then we can say that, demand for dining plans was:

   a. Elastic
   b. Inelastic
   c. Unit elastic
   d. Inferior

5. In efforts to finance the Health Care Reform Bill, President Obama has placed a 10 percent excise tax on indoor tanning services. This is a *tax paid by consumers* to improve the health of the American population. Which of the following statements is true?

   a. Consumer burden will be less than producer burden
   b. Consumer burden will be greater than producer burden
   c. Deadweight loss will be greater than if it were a tax on producers
   d. The statutory incidence (party who sends the check to the government) is irrelevant as to who bears the burden of the tax.

6. Suppose that the marginal cost of producing Captain America action figures is constant. This is consistent with

     a. Diminishing marginal productivity
     b. Gains from specialization
     c. Natural monopoly
     d. None of the above

7. Daniel and Kerren both spend all their allowance on Candy Corn and Snickers bars and they both buy some of each. Daniel had a budget of $10 and Kerren $5.

Which of the following statements must be true?

     I.   At their consumption points, both Daniel and Kerren have the same Marginal Rate of Substitution of one good vs. the other.
     II.   Daniel purchases twice as much Candy Corn as Kerren does.

     a. I
     b. II
     c. I and II.
     d. Neither statement is correct.

8. John sells cotton in a competitive industry. Recently, he hired a financial analyst to analyze his firm's performance. The analyst discovered that John's producer surplus is zero. The analyst must have concluded that the firm's

     a.   Total revenue equals total costs.
     b.   Total revenue is less than total costs.
     c.   Total revenue is greater than total variable costs.
     d.   In the long run the firm should stay in the industry.

9. Suppose that the construction industry is perfectly competitive and was in a long run equilibrium. The government intervenes in the market with the American Recovery and Reinvestment Act of 2009 (we will call it ARRA 2009), in which the government undertakes a variety of construction projects such as building bridges, roads, and train tracks. Assume this is a permanent program with no expiration date.
We can interpret this change as:

a. an increase in aggregate demand which will lead to higher prices both in the short run and the long run.
b. an increase in aggregate demand which will lead to higher prices in the short run but not in the long run.
c. an increase in the demand facing only one specific firm in which case market price does not change in either the short or long run.
d. a decrease in the industry supply curve and hence an increase in prices in both the short and long run.

10. If a simple monopolist of the oil market is now able to perfectly price discriminate, what should we expect to observe in the oil market?

      I.   Producer surplus will increase.
      II.   Consumer surplus will increase.
      III.   Output will increase.
      IV.   Output will decrease.
      V.   Deadweight loss will increase.

a. I and II
b. I and III
c. II and III
d. II and IV
e. II, III and V
f. I,III and V

11. Suppose that demand is completely inelastic and supply is upward sloping. Moreover, every unit produced causes pollution damage to the environment equivalent to $50. In this case, a per unit tax $30 will:

      i. Improve efficiency
      ii. Decrease producer surplus

a. Only i
b. Only ii
c. Both i and ii
d. Neither i nor ii

12. Two team members on a crew team, Kate & Pippa, need to decide how much effort to put into a race. Each can choose either effort (E) or shirk (S). The payoff matrix is specified as follows:

		Kate	
		E	S
Pippa	E	Kate: 0 Pippa: 0	Kate: 1 Pippa: 3
	S	Kate: 3 Pippa: 1	Kate: 2 Pippa: 2

Their coach knows that only if they both put in effort will they win and adds a bonus of $3 each for a win. In this case:

  I.   Without the bonus the Nash Equilibrium will not yield a win.
  II.   With the bonus the Nash Equilibrium will yield a win.

 a. I only.
 b. II only.
 c. Both I and II
 d. Neither statement is correct.

13. Dan, a Wharton graduate who now works in Investment Banking, claims that an increase in the capital gains tax will force billionaires like Warren Buffet to pay more taxes. Assuming Dan is correct, which of the following statements is true?

 a. The Lorenz curve will move further away from the 45 degree line and the Gini coefficient will increase.
 b. The Lorenz curve will move further away from the 45 degree line and the Gini coefficient will decrease.
 c. The Lorenz curve will move closer to the 45 degree line and the Gini coefficient will increase.
 d. The Lorenz curve will move closer to the 45 degree line and the Gini coefficient will decrease.

14. Doug, like many young adults in their 20s, is finding it hard to pay rent on his wages of $15,000 a year and is moving back to live with his parents. This is unlikely to be measured as an increase in poverty rates because:

 a. Only the unemployed are poor and Doug has a job.
 b. As he is living in a house and not on the street he cannot be poor.
 c. Unless his parents were poor before he moved in he cannot be poor now that he joins them.
 d. $15,000 is way more than average income in China so he cannot be poor in any case.

Answer Key:
1. b
2. c
3. b
4. b
5. d
6. c
7. a
8. b
9. b
10. b
11.d
12. c
13. d
14. c

This is still Part I: Please answer in blue book 1.
Q1. Comment: explanation in this question should be limited to <u>one sentence each</u>. There is truly no need for more.

Land-o-Lights is a candle manufacturer in a perfectly competitive market that has 100 identical firms. Each candle sells for $1.

We will start the analysis in 2010 when Land-o-Lights had a marginal revenue product curve (in $):

MRP=10 - l   where *l* is the number of workers the firm hires.

   a. How many workers will the firm hire at the wage of $2? How many workers will be hired in the market as a whole?

Suppose that the supply of labor in 2010 is given by:

$L^s = 100 * w$

   b. What would be the quantity of labor supplied at a wage of $2? What is the level of unemployment at this wage rate?
   c. What is the equilibrium wage rate and employment in this market? What is the level of unemployment in equilibrium?

Now it is 2011 and Dhruv, a consultant hired by Land-o-Lights, measures the firm's marginal revenue product and finds it equal to

MRP=20 - l   where *l* is the number of workers the firm hires.

   d. Dhruv claims this is consistent with an increase in the price of candles. Is he correct? If so, what is the new price of candles? If he is not correct, explain why not.

   e. Casey, a second consultant, thinks that that it is a change in technology that explains this new MRP. Could she be correct? Explain why or why not.

   f. Jay, the firm's CEO, mentions that they just purchased new machinery. Could that explain the new MRP? What assumption would you need to make in this case?

Answer Key:
a. $2 = 10 - l^*$ gives $l^* = 8$. With 100 firms $L^* = 100*8 = 800$

Points: 3
l^*=8: 2 (1 for set up, 1 for answer)
L^*=800: 1

b. $Ld = 100*2 = 200$.
$Ld = 800$ (as found in the previous question). Since Ld exceeds Ls there is excess demand for labor at this wage rate, so every working seeking a job at wage rate of $2 finds a job and there is 0 unemployment.

Points: 3
Ls=200: 1 (1/2 for set up, 1/2 for answer); No unemployment: 2

c. First deriving the aggregate labor demand curve:
$W = 10 - l$ means that $l = 10 - W$ so $100*l = Ld = 1000 - 100w$.
In equilibrium Ld=Ls so, solving $1000 - 100w = 100w$ gives $w^* = 5$, $L^* = 500$).
As this is an equilibrium there is no excess supply and unemployment is again 0.

Points: 4; Finding Ls: 1; W*=5: 1; L*=500: 1; Zero unemployment: 1

d. If MRP=MP*P as originally P=1 we know that MP=10-l . There is no P for which p*(10-l)=20-l so it cannot be a change in price that caused a shift of the MRP curve. Another way to state this: this change in MRP is NOT a rotation. We know that a change in P would cause a rotation of MRP hence this could not be caused by a change in P.

Points: 3
No:1; Showing inconsistency with equation or understanding that this is not a rotation of the curve: 2

e. Indeed she could be correct. An improvement in technology could increase MP to MP=20-l so that even with the same P=1 we get MRP=(20-l)*1=20-l

Points: 3
Yes:1; Explanation (link to marginal product): 2
Note: if state only that MRP changes without mention of MP: 1 out of 3

f. Indeed Jay could be correct. More capital could also increase MP to MP=20-l so that even with the same P=1 we get MRP=(20-l)*1=20-l.
This would happen if capital and labor were complementary inputs so that more capital increases MP of labor.

Points: 4
Yes:1; More K increases MPl:2; Inputs are complements:1

Part II: Please answer in blue book 2.
Q2. (26 points)
You will need to draw a series of graphs to answer this question.
Please DO NOT be lazy. Draw new graphs for each part. Label them clearly. Use color pens when deemed helpful. **Full credit depends on the ability of the TA to follow your work!**

Suppose that the market for vaccines is characterized by an upward sloping supply and downward sloping demand.
Start by assuming that there are <u>no externalities</u> in this market.

    a. Draw a typical Supply and Demand graph for this market and show the equilibrium price and quantity. Show graphically the total surplus generated by this market.

    b. At the equilibrium price some people do not purchase vaccines. Show these people <u>on your graph.</u>

    c. In order to encourage vaccinations the government wishes to make them more affordable. It thus decides to subsidize them by a set amount (s) per unit. Will such a policy increase the number of people who are vaccinated? Explain <u>using a new graph</u>. Show the total surplus generated by this market with this policy in place. Is this policy efficient? <u>Explain using your graph.</u>

Now let us modify the analysis taking into account the fact that when people get immunized they will not only stay healthy themselves but will also reduce the probability that others get sick.
Assume that the externality is equal to s per unit.

    d. What type of externality is this?

    e. Re-do part a taking this externality into account. Use a new graph.

    f. Re-do part c taking this externality into account. Use a new graph.

Shep agrees that there is an externality as described above, but he suggests that the market for vaccines is better characterized as a natural monopoly.

    g. Re-do part c under these conditions. Use a new graph.

    h. If Shep is correct, can a per unit subsidy be used to achieve efficiency? Be specific.

Answer:
a. Typical upward sloping supply and downward sloping demand with P* & Q*

Points: 2

b. As in midterm 1, indicate units greater then Q*.

Points: 2

c. Describe this as either supply shifts out or demand shifts out. Either way the number of people vaccinated increases. In the context of this problem (in which no issue of externalities is raised) the subsidies create DWL from over production and thus do not lead to an efficient outcome.
Total Surplus: C.S.+P.S.-Subsidy expenditure.
Note: this also equals pre subsidy (C.S.+P.S.) minus DWL.
For efficiency: Need to show graphically DWL or that at Q_1 MC>MB.

Points: 5
General understanding of subsidy graph: 1 point
New equilibrium quantity: 1 point
Greater than Q*: 1 point
DWL _or_ MC>MB market clearly on the graph and thus inefficient: 1 point (must have explanation)
Total surplus: 1 point

d. Positive externality.
Points:2

e. Student should include an SMB line outside of the original demand OR a SMC line outside of the original supply line. Either way the new line should be parallel since we specify a constant per unit size of s. The mkt equilibrium stays the same as before. Student needs to show that the total surplus now adds the total value of the positive externality up to the market equilibrium quantity.

Points: 4
SMB or SMC: 2 points (only 1 if not parallel or if size s not clearly marked).
Showing new total surplus: 2 (if state equation without clear ink to graph 1 out of 2)

f. Note that now the subsidy internalizes the externality. The new market equilibrium will be at the efficient output so there is no DWL.
Total surplus equals: C.S.+P,S.+ externality-subsidy. As the externality and subsidy cancel each other out we get T.S.=C.S.+P.S.

Points: 4
Market outcome as in part c: 1
Efficient: 1

Showing T.S.: 2 (again, only 1 point for equation w/o graph)

g. Now we need to draw the natural monopoly graph from midterm 2 with downward sloping demand and MR. A constant MC makes a good simplifying assumption.
The firm will produce where MR=MC. Even if the firm gets a subsidy of s and therefore their MC shifts down to SMC they will still under produce in terms of efficiency as SMC=MR<MB=D.
The subsidy solves one problem (externality) but not the other (monopoly output). Total surplus will be area between D & MC up to Qsub (again externality benefit and subsidy outlay cancel each other out).

Points: 5
Basic Natural monopoly graph with equilibrium quantity marked: 1
Efficient output correctly marked: 1
Equilibrium with subsidy correctly marked: 1
Noting that Q with subsidy still less then Qeff (pr showing correct DWL): 1
Total surplus: 1

h. A big enough subsidy would shift MC down enough so that the firm new MC' is equal MR at the efficient output. Corporate Welfare as we know it?

Points: 2
Subsidy> s: 1
Showing correctly on graph: 1 point.

Part III: Short Answer Questions 3. Please answer in blue book 3.
Q3. (12 points)

Mootown is a small dairy town in Texas. The ranchers there, Harvey, Isidore, and Jackie, have the following incomes:

Harvey: $40
Isidore: $70
Jackie: $150

The mayor of the town is considering building a giant cheese churn for the whole town to use. It will take a year to build, but in a year it will produce $300 worth of cheese, to be evenly distributed to the town's three ranchers. If built, the churn will cost $120 today.

   a. If the interest rate is 50%, what is next year's $300 worth in today's dollars? Is this a worthwhile investment?

   b. What is each resident's private marginal benefit from purchasing the churn?

To build the giant town-wide churn, the mayor proposes that Harvey and Isidore each contribute half of their incomes and Jackie contributes the rest of the money needed. However, each resident has the ability to veto the plan.

   c. How much would each resident contribute if the plan were enacted? Do you find the financing scheme equitable?

   d. Will the giant churn get built or will someone veto it? For each resident, explain why he or she will or will not veto the plan.

Seeing no reason to consider building only one churn, the mayor does some investigating and finds out that if they build one giant churn they can build a second one that costs only $100 today and which will contribute $225 next year; the benefits will again be shared equally among the ranchers.

The mayor is not a creative type and so he proposes that to finance the second churn Harvey and Isidore should each contribute half of their remaining income (after they buy a first churn) and Jackie will contribute the rest of the money necessary to build the churn, however any resident can veto the plan.

Assume that the interest rate is the same as given above.

   e. Is it efficient to build the second churn? Why or why not?

   f. Will the 2nd giant churn get built or will someone veto it? If the churn does not get built, explain why not.

Answer Key:
a. $PV=FV/(1+r)=300/(1+.5)=300/1.5=200$.
As $PV=SMB=200>120=MC$ it is worth investing.

Points: 3
PV=200: 2(1 for method, 1 for answer)
Whorthwhile:1

b. 200/3=66.67 or so

Points:1

c. Harvey contributes 40/2=20
Isidore 70/2=35
Jackie=120-(20+35)=65
Sure it is fair. Or not.

Points: 2
½ each statement

d. For each resident MB>tax payment so all will support the plan.

Points: 2

e. $SMB=225/1.5=150>100=MC$ so it is efficient.

Points: 2

f. Note that each resident gets a benefit of 150/3=$50.
Harvey's contribution would be 20/2=10<50 : will support
Isidore 35/2=17.5: will support
Jackie=100-(10+17.5)>50: will veto
The churn will not be built under this tax policy.

Points: 2
SMB:1 point
three calculation: ½ (together)
Conclusion: ½

You are done! Have a great break!