ECON 001 Fall 2015
A. Duchene
Final Exam
December 11, 2015
Time Limit: 120 Minutes

Name (Print): _____

Recitation Section: _____

Name of TA: _____

Read these instructions carefully:

- This exam is Dr. Duchene's exam. If your professor is Dr. Stein, you are in the wrong room.
- This exam contains 13 pages (including this cover page) and 17 questions. **Do not detach the pages.**
- This is a closed-book, closed-note exam, no calculator exam. You have 120 minutes to complete it.
- Answer the multiple choice questions by circling the correct answer. Make sure that your answer is clearly circled or it will be marked incorrect.
- Write your answers to the other questions in the spaces provided below them. If you don't have enough space, continue on the back of the page and state clearly that you have done so.
- Do not remove any pages or add any pages. No additional paper is supplied
- Show your work when applicable. Use diagrams where appropriate and label all diagrams carefully.
- You must use a pen instead of a pencil to be eligible for remarking.
- This exam is given under the rules of Penn's Honor system.

My signature certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination.

Please sign here _____ Date _____

Question	Maximum	Grade
MC (Q1-13)	36	
1st SA (Q14)	6	
2nd SA (Q15)	22	
3rd SA (Q16)	18	
4th SA (Q17)	18	

Multiple Choice Questions (best 12 out of 13: 36 points)

1. (3 points) Imagine that you are a producer of bicycles. Lately, the price of the aluminum that you use to produce the bikes has decreased due to a recent glut in aluminum production. On top of that, the price of motorized scooters has been on the rise, and bicycles are, to many people, a substitute. What would you expect to happen to the price of bicycles, given the above?

    A. The price of bicycles will increase

    B. The price of bicycles will decrease

    C. The price of bicycles will not change

    D. There is not enough information

    Solution: D

2. (3 points) If there are two goods (X and Y) and the price of good X decreases, a consumer's quantity demanded for good

    A. Y will increase only if it is a Giffen good for her

    B. X will increase only if it is a Giffen good for her

    C. X will increase only if it is an inferior good for her

    D. X will decrease only if it is a Giffen good for her

    E. None of the above

    Solution: D

3. (3 points) It's 6pm and I want to get something for dinner. I have a coupon that takes \$3 off on any order at Sweetgreen Salad. I will use the coupon for sure if I buy a salad there. The coupon expires at midnight. I am considering getting a salad there at a regular price of \$8 that I value at \$12. Now a friend calls and tells me there's free pizza at Houston Hall. What is my opportunity cost of giving up salad and getting the free pizza for dinner?

    A. \$3

    B. \$15

    C. \$7

    D. \$4

    Solution: C

4. (3 points) A monopolist faces a demand curve for its product that is given by $P = 16 - Q$ (so its marginal revenue is $MR = 16 - 2Q$). The firm implements a small price change that results in a decrease in both revenues and consumer surplus. This implies that the

    A. price was reduced and the initial price was greater than 8

    B. price was increased and the initial price was greater than 5

    C. price was reduced and the initial price was less than 8

D. price was increased and the initial price was greater than 8

E. none of the above

Solution: D

5. (3 points) Seth produces and sells widgets. The competitive market price is \$10. It is the short-run and he has fixed costs. Seth has two short-run options: produce nothing or produce and sell 1,000 widgets. If he produces 1,000 widgets his average variable cost is \$7 and his average fixed cost is \$4. What should Seth do?

   A. Produce and sell 1,000 widgets, even though his profits will be negative

   B. Produce and sell zero widgets, even though his profits will be negative

   C. Produce and sell 1,000 widgets, making a profit because price is greater than AVC.

   D. There is not enough information

Solution: A

6. (3 points) A Pigouvian subsidy is:

   A. appropriate when the marginal social cost curve is above the marginal private cost curve.

   B. designed to discourage activities generating externalities.

   C. designed to encourage activities generating external benefits.

   D. appropriate when the marginal social cost curve and the marginal social benefit curve intersect at an inefficient level.

Solution: C

7. (3 points) The local market currently has a monopoly that perfectly price discriminates. The monopolist faces an upward sloping marginal cost and a downward sloping demand. Now the government wants to regulate by requiring it to produce the perfectly competitive output at the perfectly competitive price. Market demand is $P = 10 - 2Q$ and the firm has a marginal cost function $MC = 2Q + 2$. Assume that market demand, marginal cost and marginal revenue function are invariant to government intervention, then how would consumer surplus (CS), producer surplus (PS) and total surplus (TS) change under this regulation?

   A. CS increases, PS decreases and TS stays the same;

   B. CS decreases, PS decreases and TS stays the same;

   C. CS increases, PS increases and TS stays the same;

   D. CS decreases, PS increases and TS stays the same;

   E. None of the above

Solution: A

8. (3 points) The long-run equilibrium outcomes in monopolistic competition and perfect competition are similar, because in both market structures

   A. the efficient output level will be produced in the long run.

   B. firms will be producing at minimum average cost.

   C. firms will earn zero profit.

   D. firms realize all economies of scale.

Solution: C

9. (3 points) "Married women are more likely to work for pay today than previously because the wages of married women have been rising." This statement is an example of:

   A. The Income Effect

   B. Diminishing Marginal Utility

   C. The Substitution Effect

   D. Discrimination

Solution: C

10. (3 points) Public goods are typically _____ due to the _____.

    A. over-consumed; tragedy of the commons

    B. under-produced; tragedy of the commons

    C. over-consumed; free rider problem

    D. under-produced; free rider problem

Solution: D

11. (3 points) Suppose that Mr. Frumble and Miss Honey are the only two residents of Busytown. They need to determine the number of firefighters the town should have. Fire workers satisfy the characteristics of a pure public good. The marginal benefit that each person receives (in dollar terms) is given by the following table.

Number of firefighters	Marginal benefit for Mr Frumble	Marginal benefit for Miss Honey
1	11	6
2	10	5
3	9	4
4	8	3

Suppose that the wage of a firefighter is \$12. What is the socially optimal number of firefighters?

A. 1

B. 2

C. 3

D. 4

Solution: C

12. (3 points) Two team members on a crew team, Katniss and Peeta, 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 (where K is for Katniss and P is for Peeta):

		Peeta E	**Peeta** S
Katniss	E	K:4 , P:4	K:1, P:10
	S	K:10, P:1	K:2, P:2

The team will win the race as long as at least one of two members puts in effort. Suppose that Katniss decides to give an incentive to Peeta and says to him: "if we win, I'll give you half of my payoff from the outcome." In this case,

I. Without the incentive there is no Nash Equilibrium that yields a win.

II. With the incentive there is a Nash Equilibrium that yields a win.

III. With the incentive both guys exert effort.

Which statement(s) is(are) correct?

A. I only

B. II only

C. III only

D. Both I and II

E. Both II and III

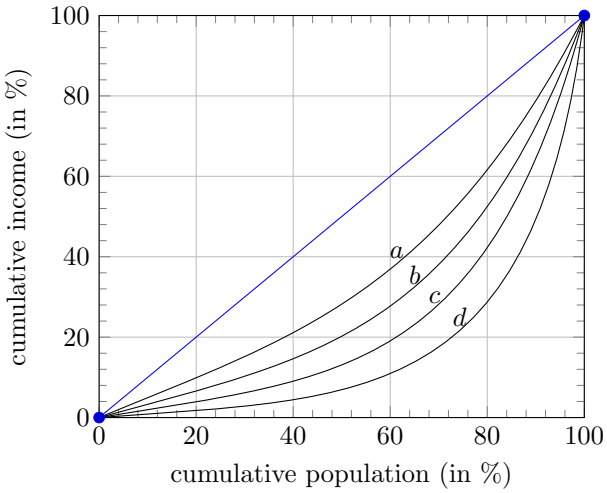
F. Both I and III

G. I, II, and III

H. None

Solution: D

13. (3 points) Use the following diagram to answer the question.



Refer to the diagram. Which of the Lorenz curves in the diagram corresponds to the largest Gini ratio?

A. a

B. b

C. c

D. d

Solution: D

Short Answer Questions (64 points)

14. Consider an oligopoly consisting of two firms. The table below depicts each firm's profits (in million dollars), depending on what price both firms charge. In each cell firm A gets the first profit and firm B gets the second.

		Firm B	
		Low price	High price
Firm A	Low price	$18, 18$	$14, 20$
	High price	$20, 24$	$16, 16$

(a) Which strategy does each firm choose in equilibrium when no collusion is allowed?

Solution: Firm A chooses high, firm B chooses low

(b) Suppose that collusion is allowed between the two firms. Could these firms benefit from collusion? Explain.

Solution: No the firms could not benefit from collusion because they already maximize the joint profit by playing their Nash Equilibrium strategies.

15. The market for potato chips is perfectly competitive. The inverse market supply and demand are:

$$P^s = 0.1Q, \ P^d = 12 - 0.1Q$$

(a) Find the market equilibrium quantity and price, (Q_m, P_m). Show your work.

Solution:

$$12 - 0.1Q_m = 0.1Q_m \quad \Rightarrow \quad Q_m = 60, P_m = \$6$$

From now on, assume that the noise of eating potato chips annoys other people, creating a negative externality. The marginal external harm depends on the quantity of potato chips eaten, Q:

$$\textbf{Marginal External Harm} = 0.1Q$$

(b) What is the equation of the marginal social benefit (MSB)? What is the Pareto efficient equilibrium quantity and price, (Q_e, P_e)? Show your work.

Solution:

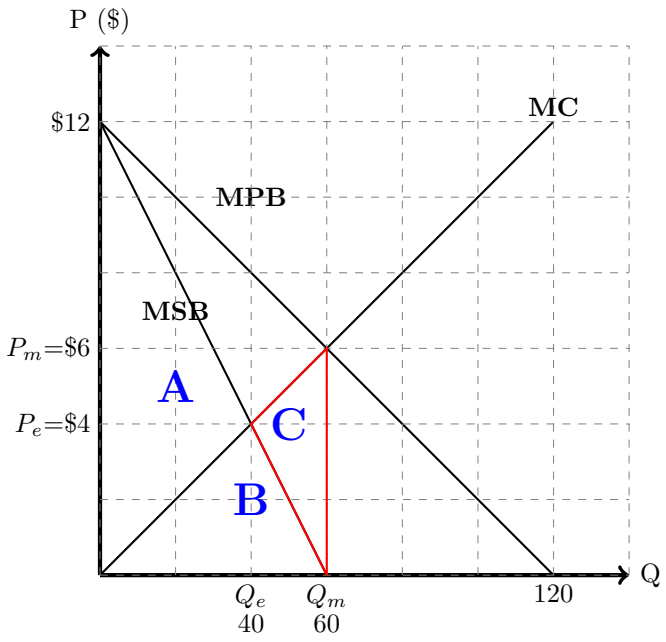
$$MSB = MPB - (\text{Marginal External Harm}) = 12 - 0.1Q - 0.1Q = 12 - 0.2Q$$

At the efficient equilibrium, MSB=MC, i.e.

$$12 - 0.2Q_e = 0.1Q_e \quad \Rightarrow \quad Q_e = 40, \ P_e = \$4$$

(c) At the market equilibrium (Q_m, P_m), find (i) total social benefit, (ii) total variable cost, and (iii) deadweight loss. Show your work.

Solution:



$$SB = A + B = \frac{1}{2} \times \$12 \times 60 = \$360$$

$$SC = B + C = \frac{1}{2} \times \$6 \times 60 = \$180$$

$$DWL = C = \frac{1}{2} \times \$6 \times (60 - 40) = \$60$$

(d) Suppose the government wants to reach the Pareto efficient quantity by levying a per-unit tax of $\$t$ on consumers. Find $\$t$. Show your work.

Solution: The per-unit tax shifts MPB downward by \$t, and we need Q to be 40 when the new $MPB' = MPB - t$ intersects MC. That is

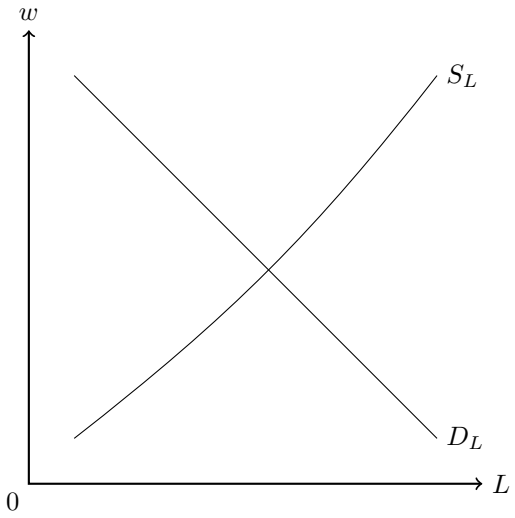
$$12 - 0.1Q - t = 0.1Q \text{ when Q=40} \quad \Rightarrow \quad t = \$4$$

(e) If the market was a monopoly instead of perfectly competitive, would the market equilibrium lead to a larger, smaller, or equal deadweight loss compared to the deadweight loss you found in part (c)(iii) ? Explain *(we expect a qualitative answer - calculations are accepted but not required)*

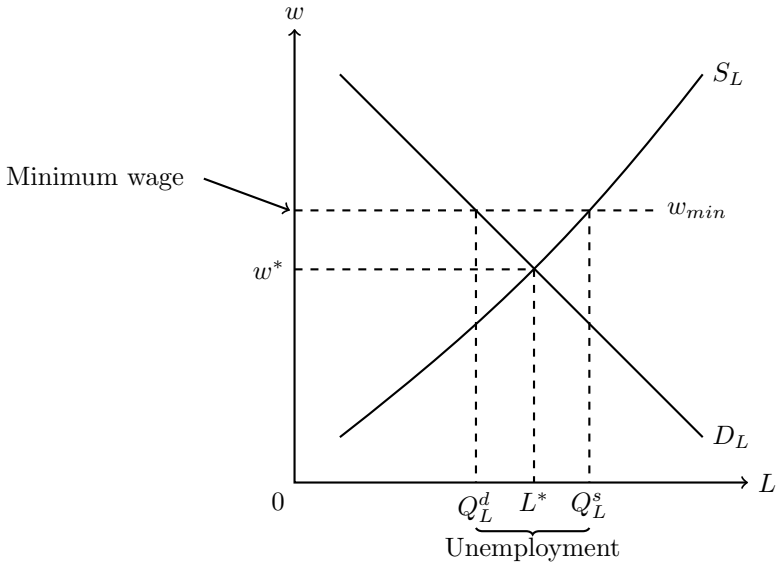
Solution: The market equilibrium with a monopoly would lead to a smaller quantity, which would be closer to the socially efficient output, so the inefficiency would be reduced and the deadweight loss would be smaller. Notice that here the MR of the monopoly would coincide with the MSB so the deadweight loss would actually go down to zero: the monopoly would produce the socially efficient quantity

16. Suppose that the market for basket weavers, the workers involved in the production of baskets, is characterized by a downward-sloping labor demand curve and an upward-sloping labor supply curve.

(a) On the graph below, show the equilibrium wage rate (w^*), employment level (L^*), and unemployment level.



Solution:



There is no unemployment

(b) Senator Paul thinks that the equilibrium level of wages for basket weavers is too low. To solve this problem, Senator Paul implements a minimum wage above the equilibrium wage level. How does this minimum wage regulation affect the wage rate, the employment level, and the unemployment level? Explain and show graphically on the above graph.

Solution:

See graph above: The wage rate increases from w^* to w_{min}, the employment level decreases from L^* to Q_L^d, and the unemployment level increases from 0 to $Q_L^s - Q_L^d$.

For the remainder of this question suppose that Senator Paul fails to pass his minimum wage regulation, so the market for basket weavers stays in its original equilibrium.

(c) Woven baskets go out of fashion, and most people switch to plastic baskets instead.

i. In the market for basket weavers, how does this change in fashion affect the demand for basket weavers, the wage rate and the employment level? Explain and show graphically on the two graphs provided below, representing the two different markets.

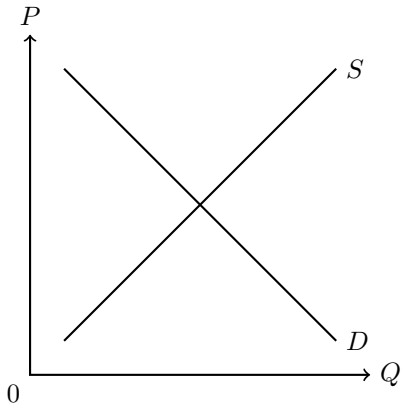


Figure 1: **Market for baskets**

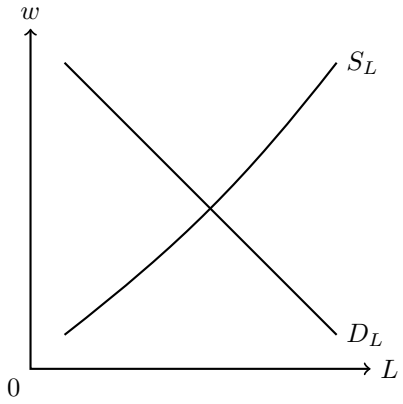


Figure 2: **Market for basket weavers**

> **Solution:** Demand for (woven) baskets decreases - shifts in. As a result the price of baskets decreases, so the demand for basket weavers rotates counterclockwise. As a result the wage goes down and employment goes down. As the wage goes down the cost of producing woven baskets goes down so the supply of woven baskets shifts out, further reducing the basket price, which makes demand for labor rotate counterclockwise even further, which decreases the wage and employment even further, etc...

ii. Why would we underestimate the impact of the change in fashion on the price of baskets if we ignored the market for basket weavers?

> **Solution:** If we ignored the market for basket weavers, we would ignore increase in the supply of baskets due to the decrease in the equilibrium wage (which reduces the cost of producing baskets). The price of baskets decreases even further due to the increase in supply, so if we ignored the market for basket weavers we would underestimate the decrease in the price of baskets.

(d) How does the price elasticity of the demand for baskets affect your answers to part c(i)? Explain.

> **Solution:** As the demand for baskets becomes more inelastic, the decrease in demand leads to a larger decrease in the basket price, which leads to a larger decrease in the demand for labor, which leads to a lower decrease in the wage and employment of basket weavers, which leads to a larger increase in supply, which reinforces the initial decrease in basket prices. So the impacts in part c(ii) are stronger.

17. Two of the best musicians of history, Bob Dylan and Eric Clapton, divide their career effort between recording albums or going on tours and playing major concerts. The table below presents how many of those, on average, they produce in a decade:

	Tours	**Albums**
Bob Dylan	3	5
Eric Clapton	8	4

During a chat in a VMA's after party, Dylan and Clapton realize they obtain similar revenues per tour and per album launched. Therefore, they decide to engage in some friendly exchange and explore their comparative advantages for the upcoming decade.

(a) Complete the following table with each good's opportunity costs for each musician. Explicitly state the units.

	Tours	**Albums**
Bob Dylan		
Eric Clapton		

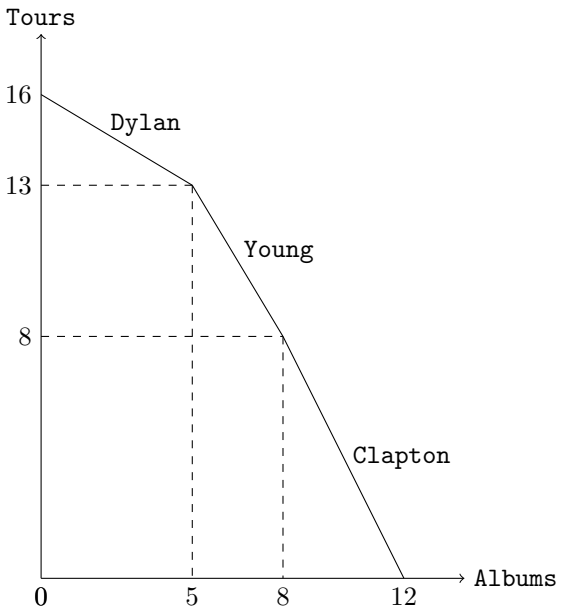
Solution:

	Tours	**Albums**
Bob Dylan	5/3 albums per tour	3/5 tour per album
Eric Clapton	1/2 album per tour	2 tours per album

One month later, on the Emmys red carpet, Neil Young meets Dylan and Clapton and hears about the plan. He then says that he goes on tour on average 5 times and records on average 3 albums every decade and wants to join the party.

(b) Graph the joint PPF of Dylan, Clapton and Young. Put albums in the x-axis, clearly label all relevant points and explain your reasoning.

Solution: The joint PPF is graphed below. The maximum number of tours that can be produced in this partnership economy is 16 and the maximum number of albums that can be recorded is 12. If the trio is in an initial situation in which it only produces tours and it starts producing albums, it must do so by exploring the technology with lowest cost of albums production. This is the "lowest hanging fruit principle". Therefore, the economy starts exploring only Dylan's technology, which has the lowest opportunity cost of producing albums, and exhausts all its recording potential. Then, the production is switched to the musician who has the second lowest cost, Neil Young, and further on to Clapton's albums production.



(c) Suppose that together they are producing 6 tours efficiently. How many albums will they be producing? Show this point on the PPF and label it A. Then fill out the table below, specifying how much of each good each musician will produce at A.

	Tours	**Albums**
Total (together)	**6**	
Bob Dylan		
Eric Clapton		
Neil Young		

Solution: Answer: If the economy is producing 6 tours, it means it is on a point in the joint PPF where y=6. This is on the part of the PPF with the slope equal to the slope of Clapton's PPF. Therefore we know that the economy is producing tours using only Clapton's technology. Plugging y=6 in Clapton's PPF equation, y = -2x + 8, yields x=1. Hence, the economy is producing 8 albums using the others' technologies and 1 album using Clapton's technology, resulting in 9 albums. We can then obtain each musician's production at A: Dylan: 5 albums and 0 tours; Young: 3 albums and 0 tours; Clapton: 1 album and 6 tours.

	Tours	Albums
Total (together)	**6**	9
Bob Dylan	0	5
Eric Clapton	6	1
Neil Young	0	3