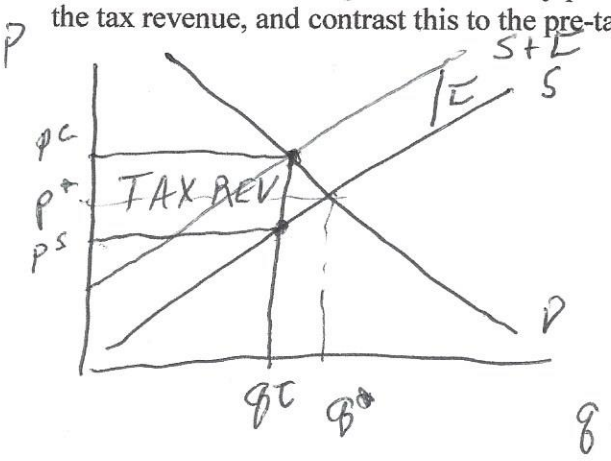
Final
PPA 897, Fall 2018
Professor John McPeak

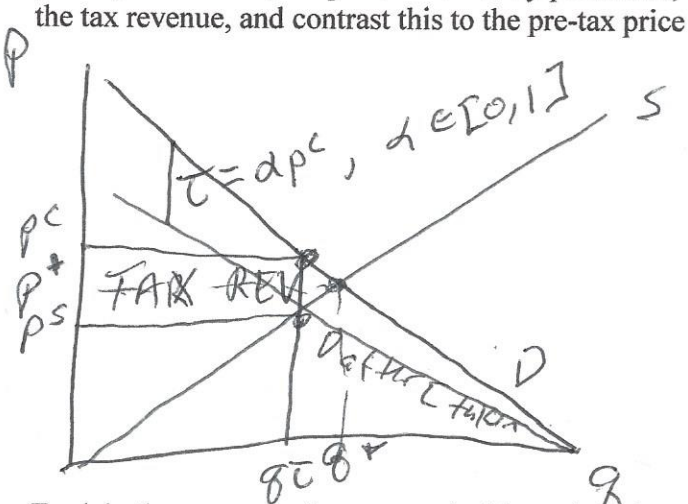
Name: KEY

The total exam is worth 30 points. Each numbered question is worth 2 points, and each sub question within a numbered question is worth an equal share of the 2 points.

1) Taxes.
   a. Show the impact of a specific tax of size τ placed on producers. Note the price paid by consumers, the price received by producers, the equilibrium quantity and the tax revenue, and contrast this to the pre-tax price quantity pair.



   b. Show the impact of an ad valorem tax rate α placed on consumers. Note the price paid by consumers, the price received by producers, the equilibrium quantity and the tax revenue, and contrast this to the pre-tax price quantity pair.

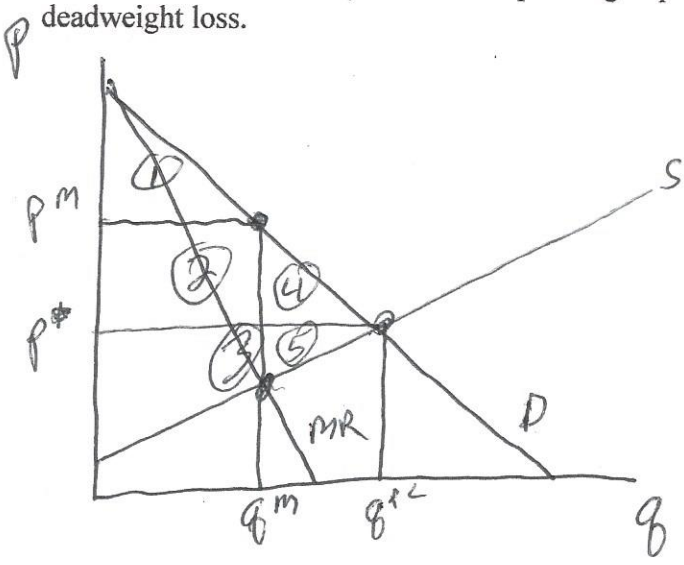


   c. Explain the concept of consumer incidence in reference to your answer to part b of this question

Consumer incidence is the share of the tax burden that comes in the form of consumers paying a higher price per unit when the tax is imposed. Formally, $CI = \frac{(P_C - P^*)}{T \text{ at } q_T}$

2) Monopoly

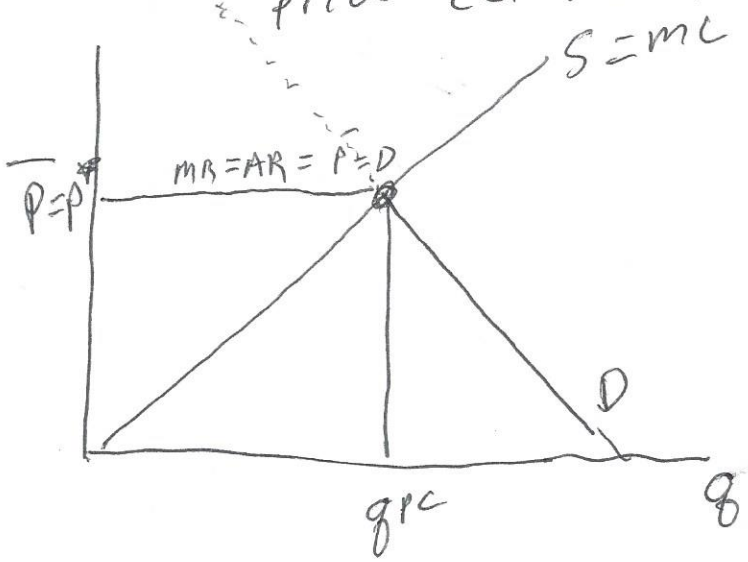
a. Illustrate on a graph the difference between a monopoly outcome and a perfectly competitive market outcome. Identify areas corresponding to producer surplus, consumer surplus, and deadweight loss.



Perfect competition
CS = 1+2+4
PS = 3+5
TSW = 1+2+3+4+5

monopoly
CS = 1
PS = 2+3
DWL = 4+5
TSW = 1+2+3

b. Illustrate a policy that could regulate a monopoly to replicate the perfectly competitive market outcome.



c. Why might this not work as a policy response to a natural monopoly?

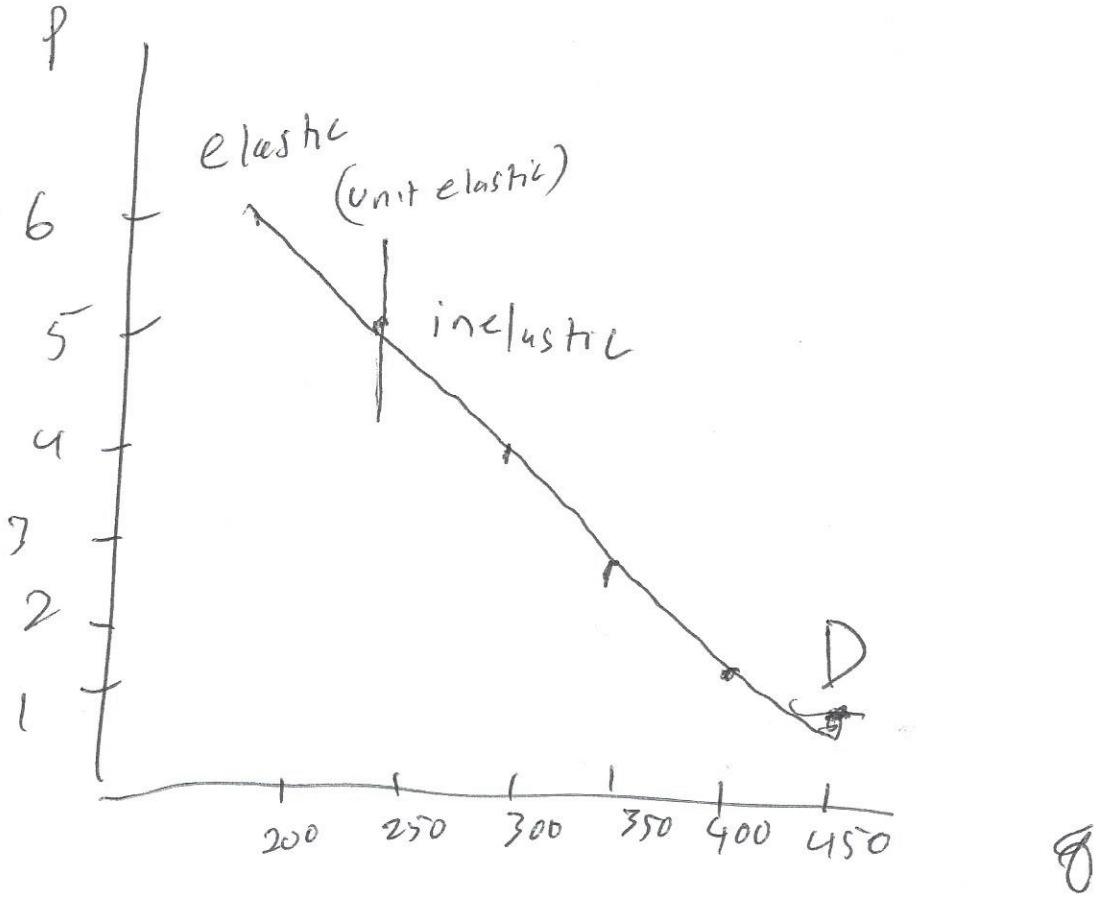
For a natural monopoly, MC is below AC over the feasible range of demand. If we set $\bar{P}$ to be where marginal willingness to pay on the demand curve equals the marginal cost/supply curve the price will be below average cost and the firm will operate at a loss and makes if they produce so shuts down $q = 0$.

3) The demand curve is given to you as q=500-50*p.

a. Fill out the following table (use the relatively higher price / relatively lower quantity pair for the denominator in the elasticity calculation)

Price	Quantity	Elasticity $\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$
1	450	----------
2	400	$\left(\frac{-50}{1}\right)\left(\frac{2}{400}\right) = \frac{-100}{400} = -0.25$
3	350	$\left(\frac{-50}{1}\right)\left(\frac{3}{350}\right) = \frac{-150}{350} = -0.43$
4	300	$\left(\frac{-50}{1}\right)\left(\frac{4}{300}\right) = \frac{-200}{300} = -0.67$
5	250	$\left(\frac{-50}{1}\right)\left(\frac{5}{250}\right) = \frac{-250}{250} = -1.0$
6	200	$\left(\frac{-50}{1}\right)\left(\frac{6}{200}\right) = \left(\frac{-300}{200}\right) = -1.5$

b. Draw this demand curve with price on the y-axis and quantity on the x – axis. Identify the range over which this curve is elastic or inelastic.

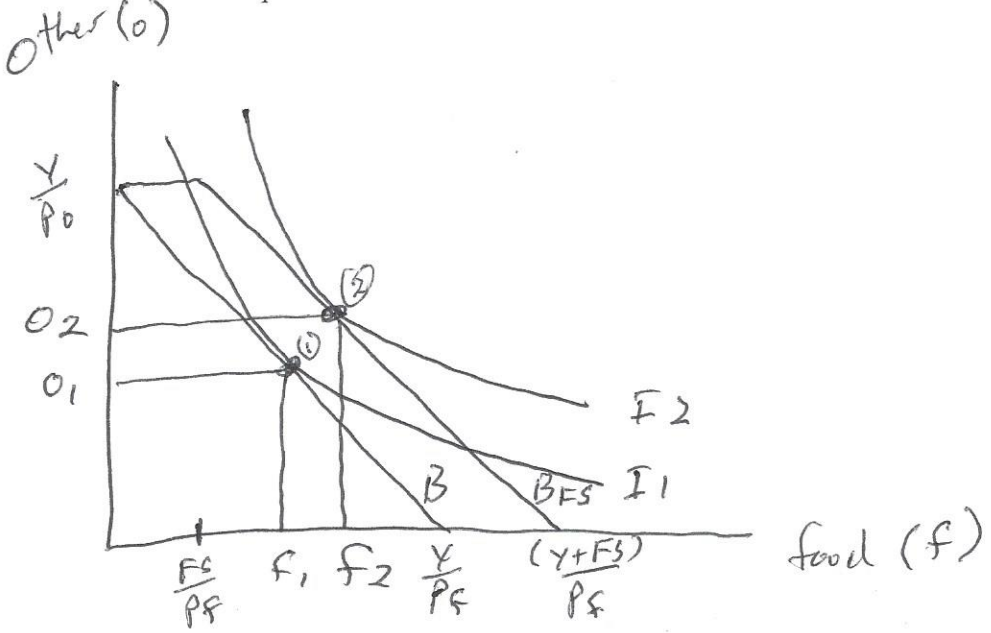


4) Circle the correct answer.

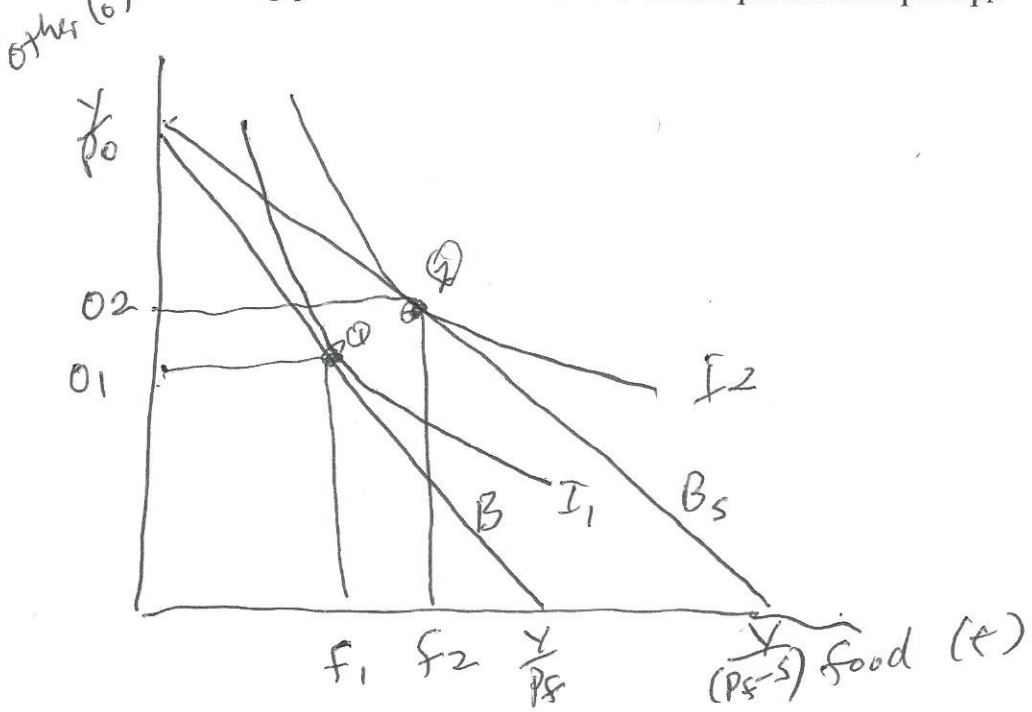
Statement	**The statement is (circle the correct answer)**
Coase's solution to the problem of negative externalities is to reduce emission quantity to where the marginal social cost of the emission equals the marginal cost of abatement.	True (False)
A Gini coefficient for the distribution of income increases from 0.5 to 0.6 over a ten-year period. This indicates income inequality is increasing over the ten-year period.	(True) False
Economic efficiency is a necessary but not sufficient condition for technological efficiency.	True (False)
The societal demand curve for a public good is derived by horizontal summation of the quantity each individual demands at a given price.	True (False)
The internal rate of return is the value of r at which present value benefits equal present value costs for a project.	(True) False
Economic efficiency is achieved when a market arrives at a Pareto optimal outcome.	(True) False
The cross price elasticity for a substitute is a negative number.	True (False)
A club good is excludable and non-rival.	(True) False
The free rider problem leads to under provision of a public good.	(True) False
A necessary but not sufficient condition for economic efficiency is profit maximization.	True (False)

5) Budget Constraints. There are two goods, food (f) and other (o). The price of food is p_f, the price of other is p_o. Income is Y. Hence the budget constraint is $p_f*f+p_o*o=Y$.

a. Draw the budget constraint and indifference curves for a consumer showing the optimal bundle with the original budget line and after the consumer has received food stamps of cash value FS.



b. Draw the budget constraint and indifference curves for a consumer showing the optimal bundle with the original budget line and after the consumer has received a matching grant of size S for each unit of food purchased at price p_f.



6) Briefly describe first how each of the following can justify government policy response, and then identify a potential policy response that addresses the problem.

a. Information asymmetry in the real estate market.

- Potential for a 'lemons market' kind of outcome / DWL of informed demand diversing from uninformed dimand.
- Policy response: mandatory disclosure and penalties if it is revealed that information was hidden that is revealed after the transaction.

b. The moral hazard problem created by selling people fire insurance.

- Potential for them to engage in more risky behavior like smoking in bed / installing indoor fire pits / bonfires on the screen porch.
- Policy response: Minimize by increasing deductible and specifying in contracts what causes of fires are not covered by the policy.

c. The positive externality conferred to citizens of a country by implementing a clean air act.

The positive externality of clean air is a kind of public good.
Implementing the act increases provision of the public good.

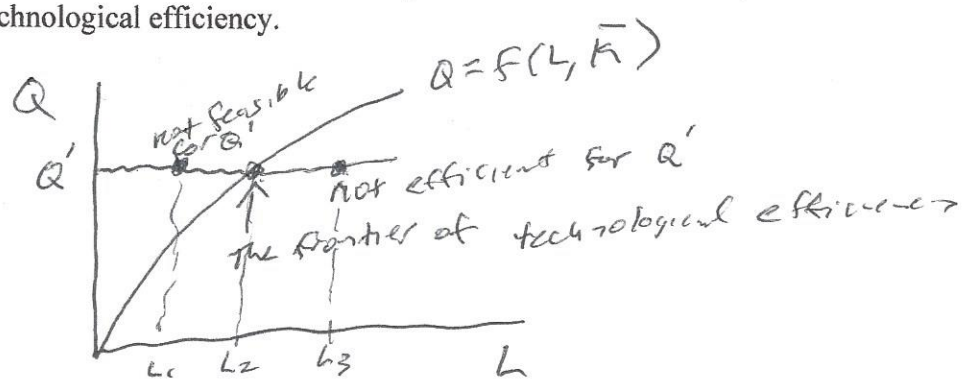
d. The negative externality of fertilizer and animal waste run-off into the City of Syracuse's water supply, which is from Skaneateles Lake.

The farmers are recognizing the marginal cost they privately face but not the marginal cost of the externality.

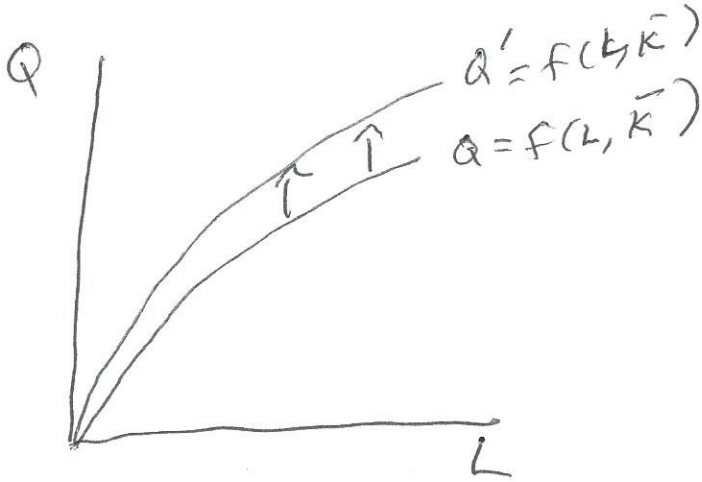
A Pigouvian tax on farm products could reduce the size of the externality.
A non-market based rule and inspection system of watershed managment could also address the problem.

7) Production functions.

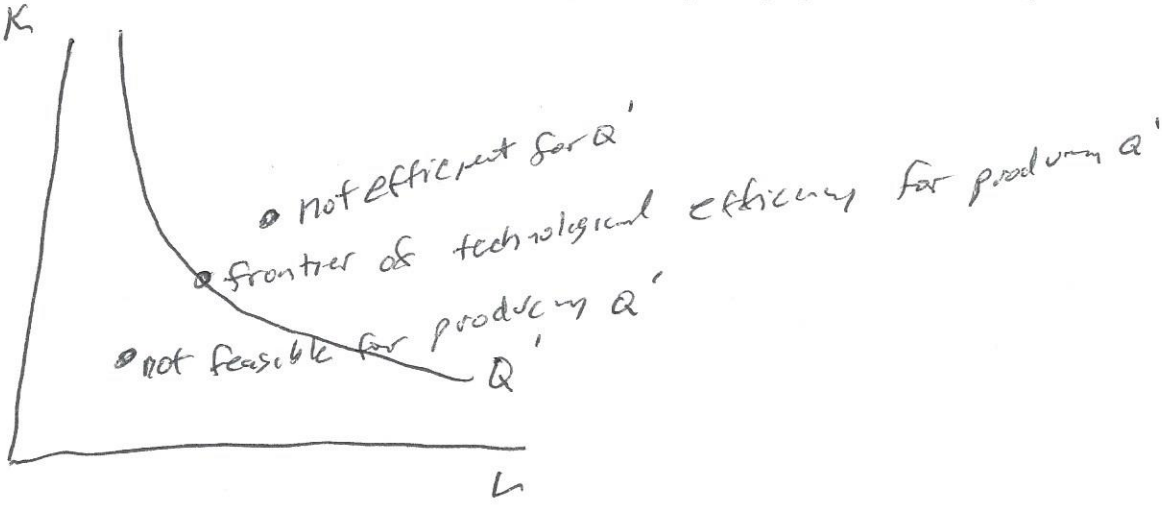
a) Draw the production function Q=f($L, \bar{K}$) noting areas that are not feasible, not efficient and at the frontier of technological efficiency.



b) Show what technological progress looks like on a production function such as the one you drew for (a)



c) Draw an isoquant of the production function Q=f(L, K) noting areas that are not feasible, not efficient and at the frontier of technological efficiency for producing a target production level Q'.



8) Market structure and externalities. The inverse demand curve is given as p=84-q. The inverse supply curve is p=20+q.

a. What is the equilibrium price quantity pair if the market structure is perfectly competitive?

$84-q = 20+q$

$64 = 2q$

$32 = q$

$84-32 = 52$ or $20+32 = 52$

$(p^*, q^*) = (\$52, 32)$

b. If there is a marginal externality generated by production of the good equal to 2*q (MC^E=2*q), what is the socially optimal price quantity pair?

$84-q = (20+q)+(2q)$

$84-q = 20+3q$

$64 = 4q$

$q = 16$

$84-16 = 68 = p$

$(p^{so}, q^{so}) = (\$68, 16)$

c. What size specific tax τ placed on producers can be used to replicate the socially optimal outcome?

$T = MC^E(q^{so}) = 2(16) = 32$

$T = 32$

$p^{so} = (MC^p) + T$

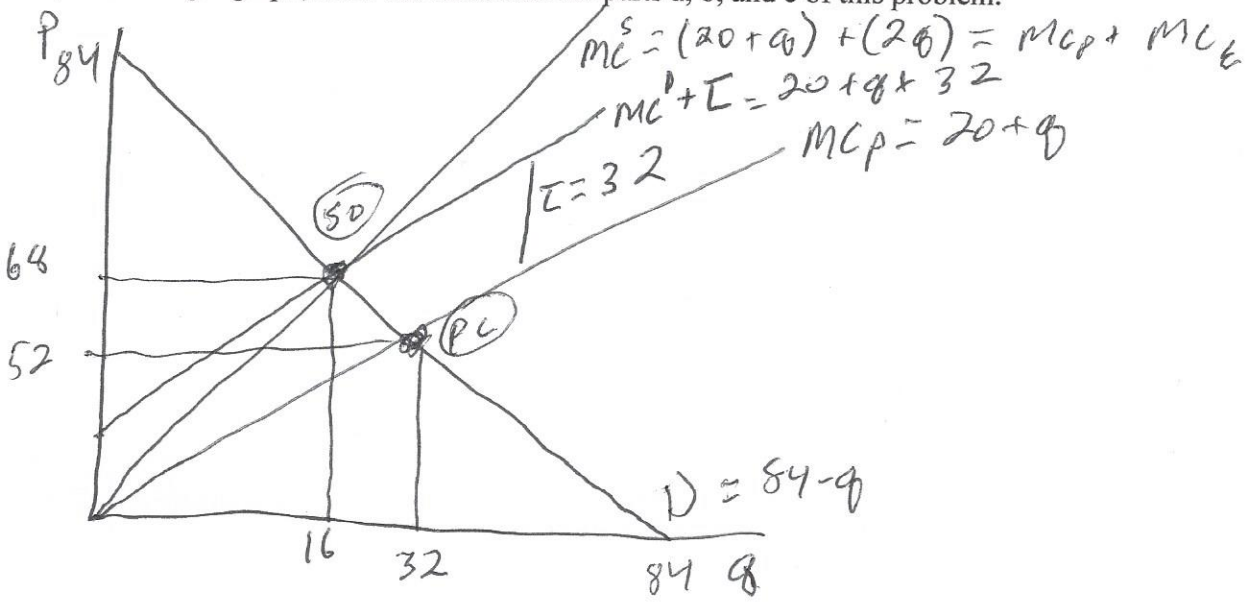
$68 = (20+16) + T$

$68 = 36 + T$

$68 - 36 = 32$

$T = 32$

d. On a single graph, draw the outcomes for parts a, b, and c of this problem.



9) Public goods. There are three people who live in a town. They each have a demand curve / WTP for the number of strands of LED lights to be put on the Christmas tree in the town square (q is the # of LED light strands). Dasher's demand is \$12.00-\$1.00*q. Dancer's demand is \$36.00-\$2.00*q. Prancer's is \$24.00-\$1.00*q.

a. If the marginal cost of an LED light strand is constant at \$28.00 and no effort is made to avoid the free rider problem, what number of LED light strands will be planted and who will provide these strands of lights?

Dancer

$36 - 2q = 28$

$8 = 2q$

$q = 4$

b. How much less is this than the socially optimal number of LED light strands if the cost of strands is \$28.00 per strand?

Dasher WTP = 0 at $q = 12$

Dancer WTP = 0 at $q = 18$

prancer WTP = 0 at $q = 24$

0 to 12 $72 - 4q$ at $q = 12$ $72 - 4(12)$, $72 - 48 = 24$ so first segment

12 to 18 $60 - 3q$

18 to 24 $24 - q$

$72 - 4q = 28$

$44 = 4q$

$q = 11$ is socially optimal So it is 7 less than socially optimal.

c. Describe why public good provision is different from private good provision using the characteristics of rivalry and excludability.

Private good consumption is rival so we horizontally sum quantities at a given price. Public good consumption is non-rival so we vertically sum MWTP for a given unit of the public good. We sum horizontally at p because the price is the means of exclusion for the private good. We sum MWTP vertically for all members of society for the public good since there is no means of exclusion

10) Cost.

a. Complete the following table.

Total Output	Fixed Cost	Total Cost	Variable Cost	Average Variable Cost	Average Fixed Cost	Average Cost	Marginal Cost
0	8	8	-------	------	-----	------	---------
1	8	23	15	15	8	23	15
2	8	37	29	$\frac{29}{2}$	4	$\frac{37}{2}$	14
3	8	52	44	$\frac{44}{3}$	$\frac{8}{3}$	$\frac{52}{3}$	15
4	8	72	64	16	2	18	20
5	8	94	86	$\frac{86}{8}$	$\frac{8}{5}$	$\frac{94}{5}$	22

b. Is this short run or long run cost information? Why?

Short run because there is a distinction between fixed and variable cost.

c. If market price for the output produced is 14, what level of output is profit maximizing for a firm if the market structure is perfectly competitive?

$P = 14 = MC(8)$ when $q = 2$.
At $q = 2$ $AVC = 14\frac{1}{2} > P = 14$
$q = 0$

or

$P = 14 = MC(8)$ when $q = 2$
$\pi(q=2) = 14 \cdot 2 - 37$
$= 28 - 37$
$= -9$

$\pi(q=0) = 14 \cdot 0 - 8$
$= -8$

$q = 0$

11) Game Theory.
United Airlines and American Airlines compete for flights on the Syracuse (SYR) to Washington National (DCA) route. They can choose to run 2 per day (14 per week) or 3 per day (21 per week) for the 7 day week. The payoffs to each are represented in the following table.

		United Airlines			
		21 per week		14 per week	
American Airlines	21 per week	82,000	82,000	102,000	76,000
	14 per week	76,000	102,000	92,000	92,000

a) Describe the full set of best responses and identify the Nash Equilibrium.

If AA 21, UA 21
If AA 14, UA 21
If UA 21, AA 21
If UA 14, AA 21

Nash equilibrium where they are playing best response to each other is when UA has 21 flights per week and gets a payoff of 82,000 and AA has 21 flights per week and gets a payoff of 82,000

b) Target and Old Navy have entry points that are side by side in a strip mall. A guard costs $10 to hire and will sit between the two doors. The benefit of a guard at the main door is $8 to each store in avoided losses. Baseline is no guard for either, no benefits (0).

		Old Navy			
		Hire		Don't hire	
Target	Hire	-2	-2	-2	8
	Don't Hire	8	-2	0	0

b) Describe the full set of best responses and identify the Nash Equilibrium.

If T "Hire", ON "Don't hire"
If T "Don't Hire", ON "Don't hire"
If ON "Hire", T "Don't hire"
If ON "Don't Hire", T "Don't Hire"

Nash is Target selects "Don't Hire" and gets 0, Old Navy selects "Don't Hire" and gets 0.

c) Can they arrive at a Pareto improving outcome if they agree to split the cost of the guard ($5 each) so the payoffs are as follows?

		Old Navy			
		Hire and split cost		Don't hire	
Target	Hire and split cost	3	3	-2	8
	Don't Hire	8	-2	0	0

No, this still has the same set of best responses which leads to the same nash equilibrium as found for part b.

12) Heifer Project is distributing milking goats to women in Mali. The cost to the project to buy the goats to distribute is $250,000 in t=0. Women will be trained in zero grazing and stable building for these goats. Training will take place in t=0 and t=1 and costs Heifer Project $100,000 in each year. The women will bear a cost of $100,000 in t=0 to build the stables and $50,000 in t=1, t=2, and t=3 to feed the goats. The added value of the milk that will be produced by these goats compared to without them is $250,000 in years t=1, t=2, and t=3.

a) If the discount rate is 10%, should this project be implemented or not according to an evaluation of NPV?

	Benefit	Cost	B − C
t=0	0	250 + 100 + 100 = 450	−450
t=1	250	100 + 50 = 150	100
t=2	250	50	200
t=3	250	50	200

$$-450 + \frac{100}{1.1} + \frac{200}{1.1^2} + \frac{200}{1.1^3} = -44$$

No it should not be implemented since NPV < 0

b) If we use a lower discount rate will this make the project more or less attractive in NPV terms? Why?

More attractive, since positive values are in the future and a lower discount rate applied to these future values will increase their present value, so increase PVB.

c) If the value added of the milk produced by these goats turns out to be $300,000 instead of $250,000 in years 1,2 and 3 do you still have the same answer as you found for part (a)?

$$-450 + \frac{150}{1.1} + \frac{250}{1.1^2} + \frac{250}{1.1^3} = +81$$

No, now the project passes a Benefit cost test with NPV ≥ 0.

13) Syracuse University is considering raising the price for a season's ticket for all men's basketball home games at the lowest level from $710 this season to $760 next season. This season, at a price of $710, they sold 25,000 season's tickets. The best available information suggests that the price elasticity of demand for season tickets is -0.89.

a. What is the predicted number of season's tickets sold next year if the price is raised?

$$-0.89 = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{Q_{new} - Q_{old}}{Q_{old}}}{\frac{P_{new} - P_{old}}{P_{old}}} = \frac{\%\Delta Q}{\frac{760-710}{710}} = \frac{\%\Delta Q}{\frac{50}{710}}$$

$$-0.89\left(\frac{50}{710}\right) = \%\Delta Q$$

$$-0.06268 = \%\Delta Q$$

$-0.06268 \cdot 25{,}000 = -1567$, New $q = 25{,}000 - 1567 = 23{,}433$

b. Compare total revenue for the two prices and number of tickets sold. Which is higher?

Old $R = \$710 \cdot 25{,}000 = \$17{,}750{,}000$

New $R = \$760 \cdot 23{,}433 = \$17{,}809{,}155$

New revenue is higher

c. How many season tickets will be sold next year if the elasticity is not -0.89 as assumed above, but is in fact -1.25?

$$-1.25 = \frac{\%\Delta Q}{\frac{50}{710}}$$

$$-1.25\left(\frac{50}{710}\right) = \%\Delta Q$$

$$-0.08803 = \%\Delta Q$$

$$-0.08803 \cdot (25{,}000) = -2201$$

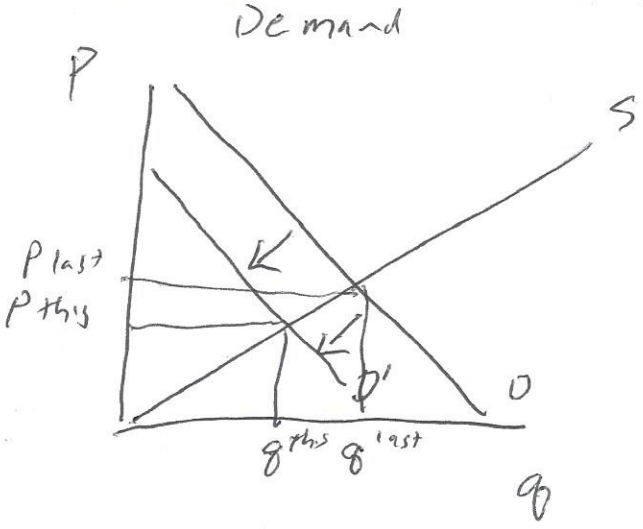
$$25{,}000 - 2201 = 22799$$

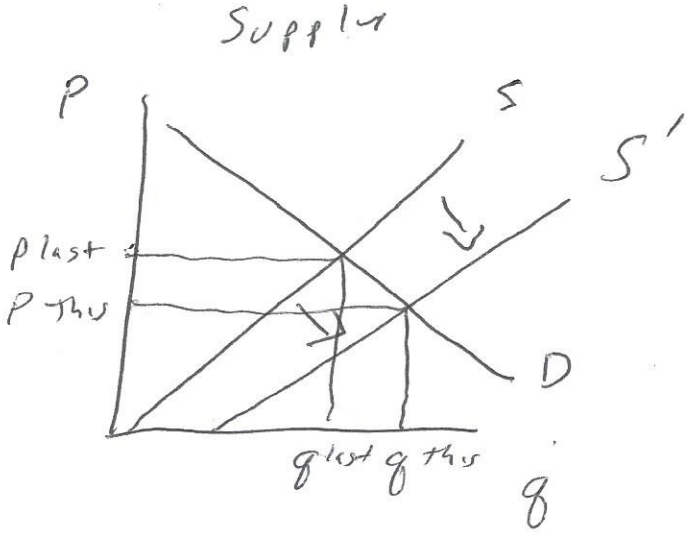
New $R = \$760 \cdot 22{,}799 = \$17{,}327{,}240$

Now old revenue was higher

14) The average nominal price of a gallon of gas has come down in Central New York since this time last year. Assume each explanation listed below is hypothesized to be the sole cause of this price decrease. Which of the following explanations can you rule out, and which can you not rule out.

Explanation	Rule out or not rule out ~~(Circle one)~~
Hydrofracking has increased US production levels of crude oil dramatically over the past year.	Rule out **Not Rule Out**
New environmental regulations make it less costly to refine oil into gasoline	Rule out **Not Rule Out**
Sanctions on Iran and Russia have limited their access to global oil markets.	**Rule out** Not Rule Out
Incomes of consumers are increasing due to the continued economic expansion.	**Rule out** Not Rule Out
Global warming has made Arctic oil reserves more accessible and production has begun in this area	Rule out **Not Rule Out**
Consumers are adopting hybrids and electric vehicles and moving away from gasoline fueled vehicles	Rule out **Not Rule Out**
Oil production in Libya and Iraq has begun to return to production levels last seen in the late 1990s after a long period of disruption.	Rule out **Not Rule Out**
Technological innovations in batteries is making electric and solar increasingly reliable and lower cost fuel sources for vehicles.	Rule out **Not Rule Out**



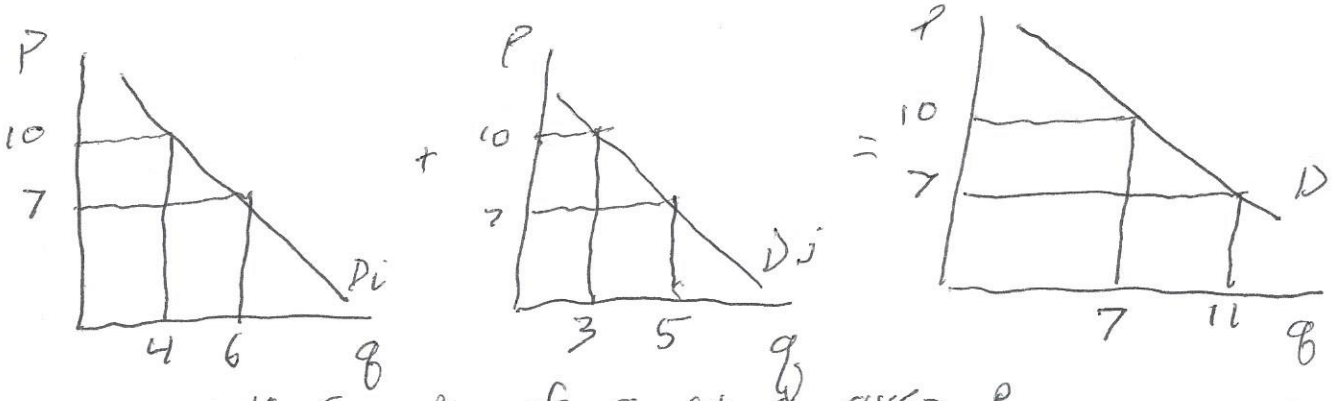


15) Types of Goods.
a) What type of good goes in which blank?

	Rival	Non Rival
Exclusion	Private	club
Non Exclusion	Commons/ open access	Public

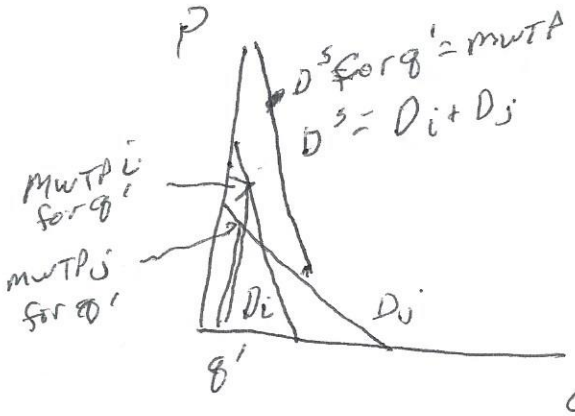
b) Illustrate how deriving the aggregate demand curve for a public good differs from deriving the demand curve for a private good, and explain how this difference relates to your answers to (a).

Aggregate demand for a private good:



Horizontal summation of q at a given P. We need to add the quantities because the good is rival. The price is the means of exclusion.

Aggregate demand for a public good:



Vertical summation of MWTP for a given unit of the good q since the good is non-rival so both can benefit from a given unit and for all members of society since there is no means of exclusion