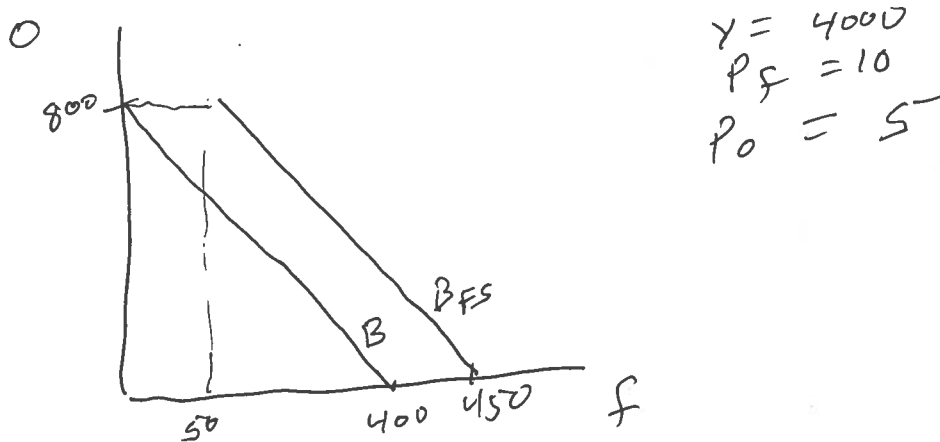


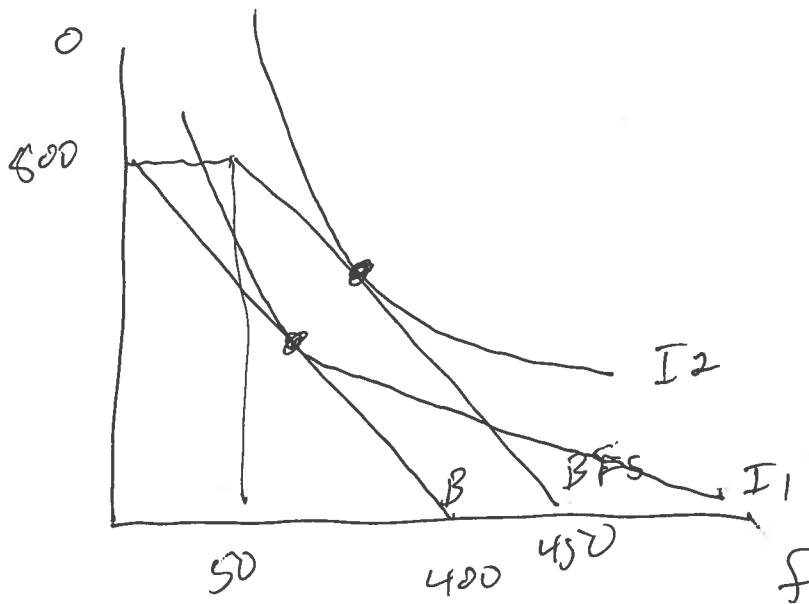
The total final is worth 30 points. Each question is worth 2 points, and each sub question is worth an equal share of the 2 points.

1) A food stamp policy is put in place in a state. The initial budget constraint is $y = p_f \cdot f + p_o \cdot o$, where f is food, o is all other goods, and the two prices are subscripted by their commodity. For our representative consumer impacted by this policy, their initial income $y = \$4000$ is supplemented by a cash value of food stamps of \$500. The price of food is \$10 per unit, the price of the other good is \$5 per unit.

- a. Draw the original budget line and the budget line after the food stamp policy is implemented.



- b. Reproduce your graph for (a), and then place on the graph indifference curves for a consumer who is made **equally well off** if we give the consumer \$500 in food stamps or \$500 in cash.



2) Market structure and externalities. The inverse demand curve is given as $p=100-q$. The supply curve is $p=20+3q$.

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

$$\begin{aligned}
 100 - q &= 20 + 3q & P &= 100 - q \\
 80 &= 4q & &= 100 - 20 \\
 q &= 20 & &= 80 \\
 & & & (\$80, 20)
 \end{aligned}$$

- b. If there is a marginal externality generated by production of the good equal to $4*q$ ($MC^E=4*q$), what is the socially optimal price quantity pair?

$$\begin{aligned}
 100 - q &= 20 + 3q + 4q & P &= 100 - q \\
 80 &= 8q & &= 100 - 10 \\
 q &= 10 & &= 90 \\
 & & & (\$90, 10)
 \end{aligned}$$

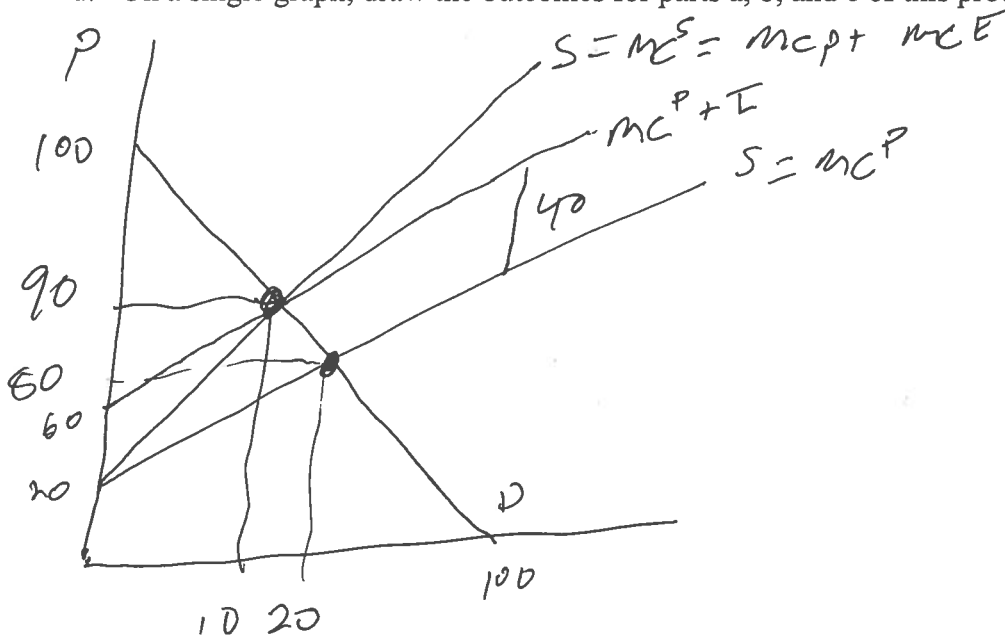
- c. What size specific tax τ placed on producers can be used to replicate the socially optimal outcome?

$$\begin{aligned}
 \tau &= MC^E(q^{so}) \\
 &= 4(10) \\
 &= \$40
 \end{aligned}$$

or

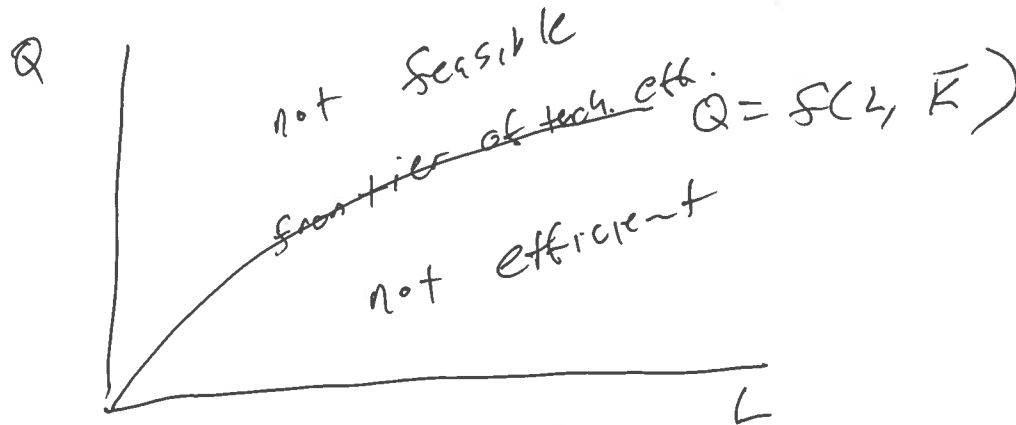
$$\begin{aligned}
 p^{so} = 90 &= 20 + 3q^{so} + \tau \\
 90 &= 20 + 30 + \tau \\
 90 - 50 &= \tau \\
 \$40 &= \tau
 \end{aligned}$$

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

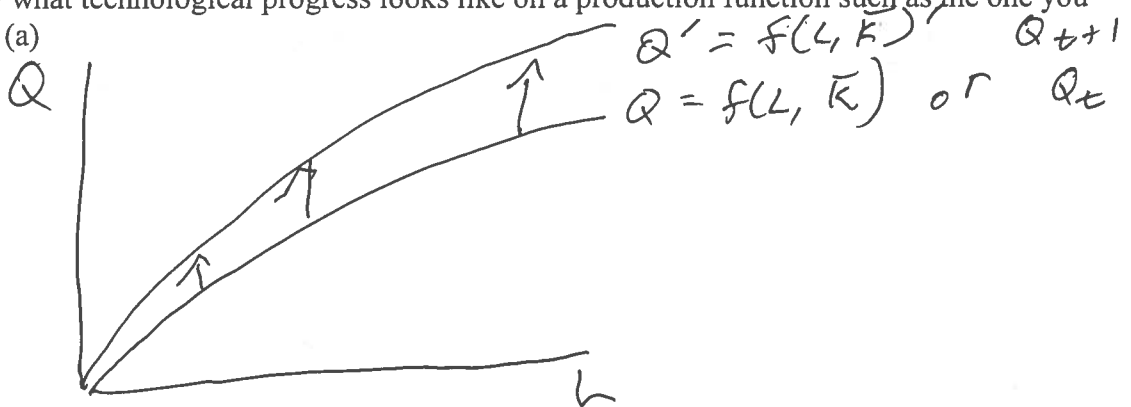


3) Production functions.

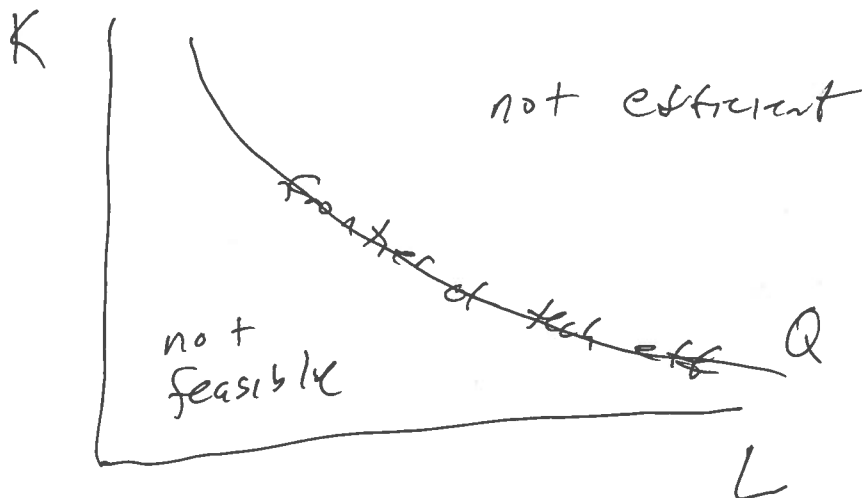
a) Draw the production function $Q=f(L, \bar{K})$ noting areas that are not feasible, not efficient and at the frontier of technological efficiency.



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' .



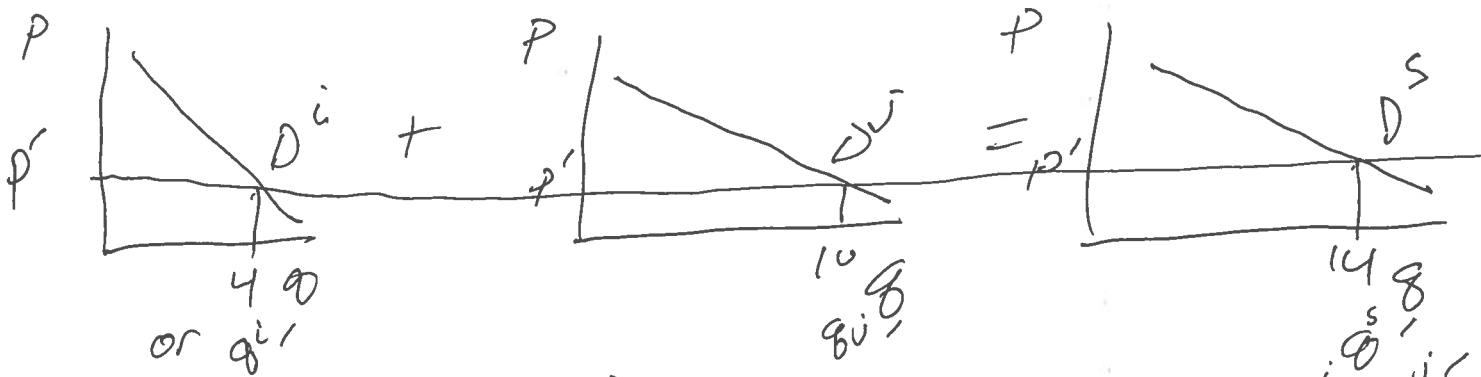
4) Types of Goods.

a) What type of good goes in which blank?

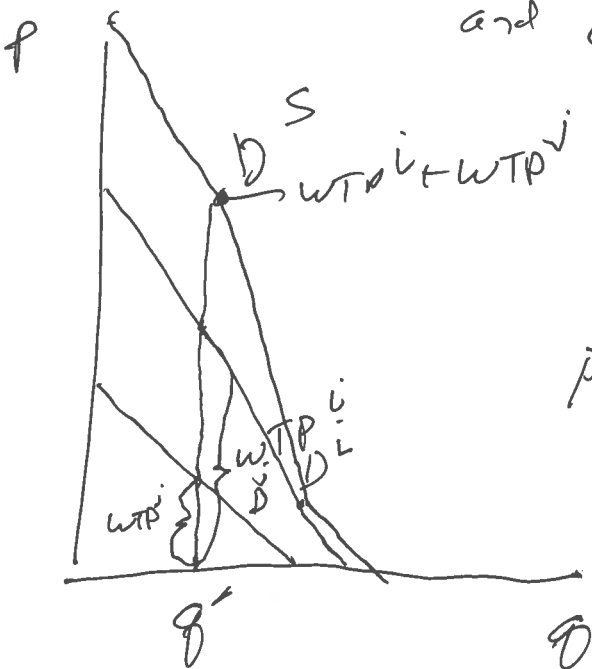
	Rival	Non Rival
Exclusion	Private	Club
Non Exclusion	open access	Public

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:



The good is rival (if i consumes 4 j consumes a different 10 to total 14) and excludable (have to pay P' per unit)



For unit q^s of the public good person i is WTP^i and person j is WTP^j . Since the good is non-rival, Total Social WTP is $WTP^i + WTP^j$. Since it is non-excludable I add up WTP for all members of society (here just i, and j)

5) Benefit cost.

We are comparing two proposals for use of decentralized climate funds in Senegal. These are funds available to help local communities fund public goods that will help them adapt to anticipated climate change. One community has proposed the following two proposals and we have to select one. The time horizon and our planning horizon is four years: $t=0,1,2,3$.

Community seed storage The seed storage facility will cost 80,000 dollars to construct in year zero and will cost 25,000 dollars to operate in years 1, 2, and 3. Currently seed damaged in storage at farmers' houses requires farmers to buy seeds in the planting season that in aggregate cost 60,000 dollars for the community per year. The benefit is that if the facility is built these seed purchases will not be necessary as seed damage in storage will be eliminated in years 1, 2, and 3.

Dry season market garden. Senegal has an 8 month long season when it does not rain. To grow things you need a well and a fence to keep out grazing animals. We could drill a well and put up a fence around a field that is not currently used for cultivation for 50,000 dollars in year zero. The anticipated costs of upkeep of the garden are 10,000 dollars per year. The new revenues from sales of things produced in the garden expected in years 1, 2, and 3 are 30,000 per year.

a) Which is the better option if the discount rate is 10%?

	B	C	B-C	DSMB	B	C	B-C
$t=0$	0	80	-80		0	50	-50
$t=1$	60	25	35	$1/1.1$	30	10	20
$t=2$	60	25	35	$1/1.1^2$	30	10	20
$t=3$	60	25	35	$1/1.1^3$	30	10	20

$NPV = 7.04$

$NPV = -0.26$

CSS is better
 Since $NPV_{CSS} > NPV_{DSMB}$

b) If my estimate of the seed storage benefit is 5,000 higher (65,000 per year) and my estimate of the garden revenue is 5,000 lower (25,000 per year) is the choice made in part (a) still the best option?

$$-80 + \frac{40}{1.1} + \frac{40}{1.1^2} + \frac{40}{1.1^3} \quad | \quad -50 + \frac{15}{1.1} + \frac{15}{1.1^2} + \frac{15}{1.1^3}$$

$NPV(CSS) = 19.47$ $NPV(DSMB) = -12.70$

Yes, CSS is still the better option

Typo in this problem

6) Public goods. Syracuse is considering putting a Disc (Frisbee) golf course in Barry Park. It will cost \$750.00 per hole / basket. There are three people left in Syracuse. Paul has a willingness to pay per hole (h) defined by $3000 - 100h$. Paige has a willingness to pay per hole defined by $750 - 75h$. Nichole has a willingness to pay per hole defined by $500 - 50h$.

a. If we do not resolve the free rider problem, and ~~10m² of ice costs \$2,000 to install~~, will anyone be privately willing to provide funding for the ~~ice rink~~? If so, how much? If nobody is willing to provide at that price, explain why.

Cost = 750.

Paul $3000 - 100h$ (30)

Paige $750 - 75h$ (10)

Nichole $500 - 50h$ (10)

$3000 - 100h = 750$
 $2250 = 100h$
 $22.5 = h$

frisbee golf course

Paul provide
22.5
18 holes

What is socially optimal number of holes?

b. (A standard hockey rink has a surface area around $1,800 \text{ m}^2$ ($q=180$ in this case). Is societal willingness to pay high enough that we could justify installing a standard hockey rink in Barry Park?)

In this case

$4250 - 225h$ 0 to 10 = 2000 @ 10

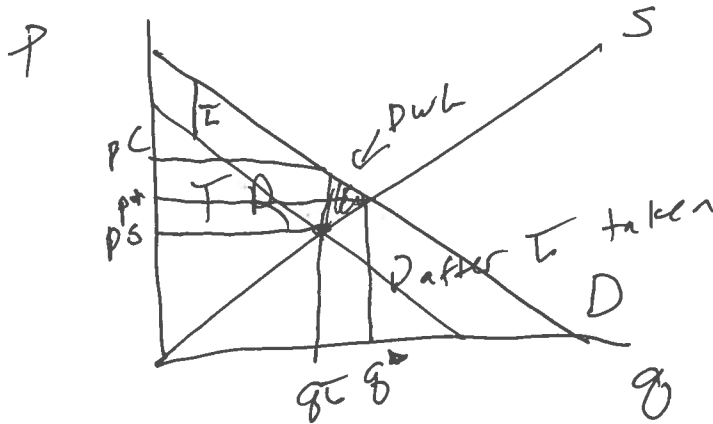
$3000 - 100h$ 10 to 30

So $3000 - 100h = 750$
 $2250 = 100h$
 $h = 22.5$

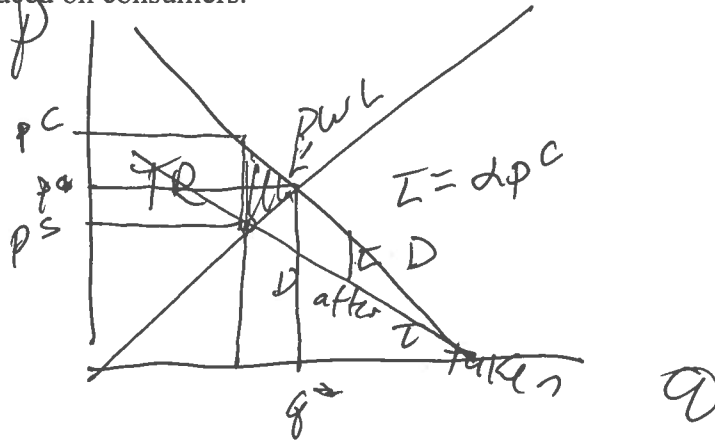
The same as in part (a) in this case

7) Tax policy.

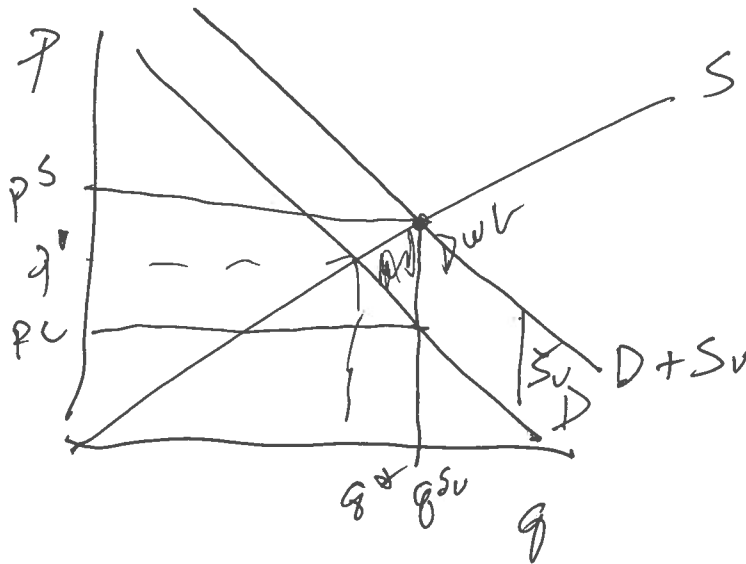
a. Illustrate on a supply and demand graph a specific tax of size τ placed on consumers.



b. Illustrate on a supply and demand graph the impact of an ad valorem tax rate α placed on consumers.



c. Illustrate on a supply and demand graph the impact of a subsidy of size S to consumers.



8) True or False

Statement	The statement is (circle the correct answer)	
The expansion path traces out all points that minimize costs.	True	False
Consumer surplus is calculated as the area below the demand curve and above the price line.	True	False
The slope of an indifference curve is called the marginal rate of technical substitution.	True	False
The income elasticity of demand for an inferior good is a positive number.	True	False
MRS=MRT at the optimal bundle for an interior solution.	True	False
Increasing the discount rate increases the present value of future costs and benefits.	True	False
A monopolist is a single supplier of a good for which there is no close substitute.	True	False
The free rider problem leads to overprovision of a public good.	True	False

b) If the costs are present value costs, and the willingness to pay figures are present value benefits, what is the net present value of each proposal?

Proposal A- wall	Proposal B - roads	Proposal C - police
-200	1600	1900

c) Did voting lead us to select the proposal that had the highest net present value? Explain why or why not.

No it did not. Yes- no voting ignores intensity of preferences.

9) Public goods, voting, and benefit cost election year edition.

A community of five people is voting to decide on public good provision. There are three proposals:

Proposal A: Build a wall around the community to prevent anyone entering or exiting. Total cost is \$3,000 (\$600 each – no they can't make somebody else pay for it).

Proposal B: Rebuild the roads in the town as the infrastructure is crumbling. Total cost is \$5000 (\$1,000 each).

Proposal C: Increase hours worked by local police to crack down on crime. Total cost is \$7,500 (1,500 each)

This table records each household's WTP for each proposal.

	⁶⁰⁰ Proposal A- wall	¹⁰⁰⁰ Proposal B-roads	¹⁵⁰⁰ Proposal C-police
Taylor	<u>\$800</u>	\$ 800	\$1,400
Feeney	\$200	<u>\$2,500</u>	\$1,000
Badger	\$200	\$ 900	<u>\$4,500</u>
Bennett	<u>\$900</u>	<u>\$1,900</u>	\$1,200
McPeak	<u>\$700</u>	\$ 500	\$1,300

c) Each household gets one yes vote to allocate across the three proposals. If they have WTP greater than cost for more than one proposal, they will give their yes vote to the proposal that has the greater difference between WTP and cost to that household. How will they vote? (circle)

	Proposal A		Proposal B		Proposal C	
Taylor	<u>Yes</u>	No	Yes	<u>No</u>	Yes	<u>No</u>
Feeney	Yes	<u>No</u>	<u>Yes</u>	No	Yes	<u>No</u>
Badger	Yes	<u>No</u>	Yes	<u>No</u>	<u>Yes</u>	No
Bennett	<u>Yes</u>	No	<u>Yes</u>	No	Yes	<u>No</u>
McPeak	<u>Yes</u>	No	Yes	<u>No</u>	Yes	<u>No</u>

PASS
Not pass
Not pass

$NPV\ 2800 - 3000$
 $NPV\ 6,600 - 5000$
 $NPV\ 9400 - 7,500$

-200
 $+ 1,600$
 $+ 1,900$

10) Syracuse University and the City of Syracuse are considering options to deal with the parking issue around campus. SU is considering expanding the Waverly lot by putting in a parking garage there. COS is considering building a larger lot on Adams street. The following table sets out the profit per day to each if the following decisions are made

		Syracuse University			
		Expand		Don't Expand	
City of Syracuse	Expand	8,100	7,100	10,500	6,600
	Don't Expand	7,600	10,300	9,200	8,400

a) Describe the full set of best response strategies for each player.

If COS E, SU E
 If COS DE, SU E
 If SU E, COS E
 If SU DE, COS E

b) What is the Nash Equilibrium outcome of this game?

COS E, SU E, [8,100 COS, 7,100 SU]

c) Is this outcome Pareto Optimal? Explain why or why not.

No. There exists higher total profits in all the other cells of the table.

The NE has a total of 15,200.

7600 + 10300 = 17900 if we could set to SU (E) COS (DE), but this would not be Pareto improving.

11) The demand curve is given to you as $q=300-30 \cdot p$.

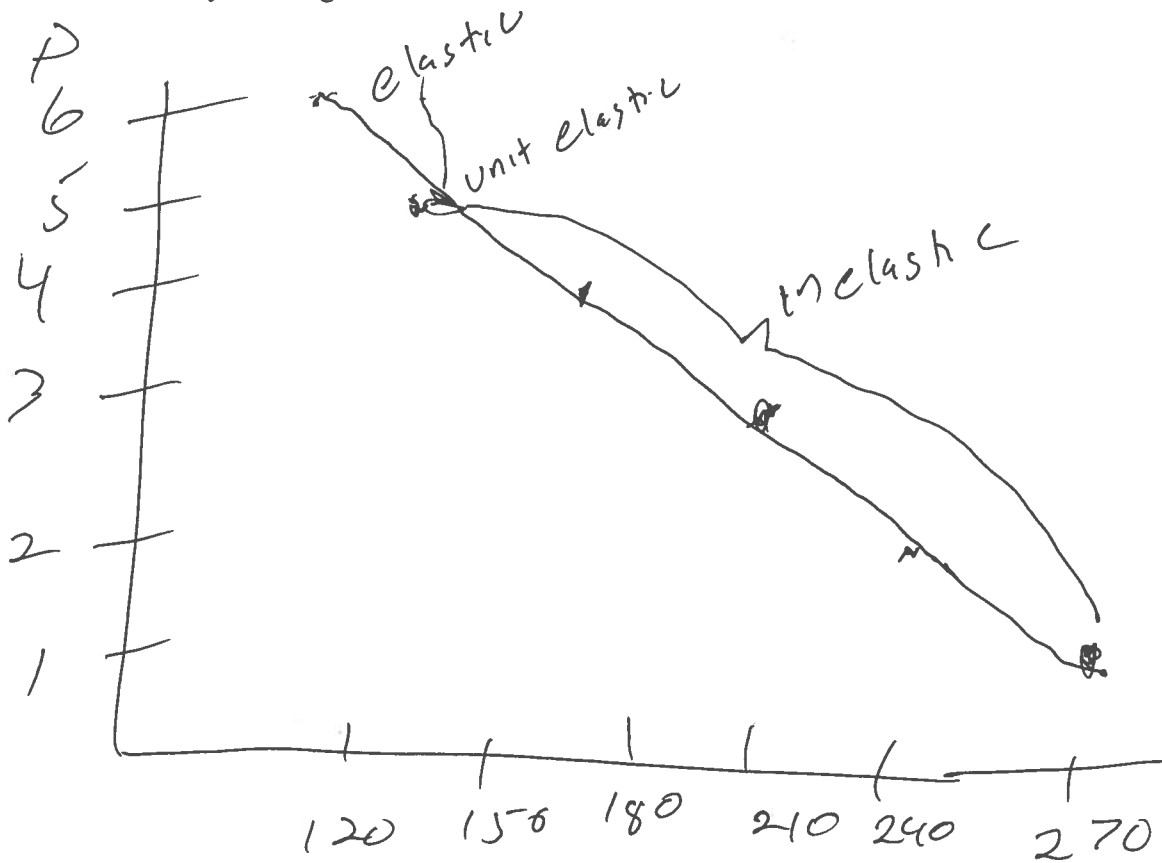
$$\epsilon = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

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
1	270	-----
2	240	$-30 \left(\frac{2}{240} \right) = -0.25$
3	210	$-30 \left(\frac{3}{210} \right) = -0.43$
4	180	$-30 \left(\frac{4}{180} \right) = -0.67$
5	150	$-30 \left(\frac{5}{150} \right) = -1.0$
6	120	$-30 \left(\frac{6}{120} \right) = -1.5$

$$\frac{\Delta Q}{\Delta P} = -30$$

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.



12) 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	10	10	-----	-----	-----	-----	-----
1	10	25	15	15	10	25	15
2	10	39	29	14 1/2	5	19.5	14
3	10	54	44	14 2/3	3 1/3	18	15
4	10	72	62	15 1/2	2 1/2	18	18
5	10	94	84	16.8	2	18.8	22

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

S.R. There are fixed costs so we are in the short run.

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?

$$P = 14 \quad MR = MC \quad \text{at } Q = 2$$

(A) At $(Q=2)$ $AVC(2) = 14\frac{1}{2}$. $P < AVC(2) \Rightarrow Q=0$
 $\pi = -10$

or

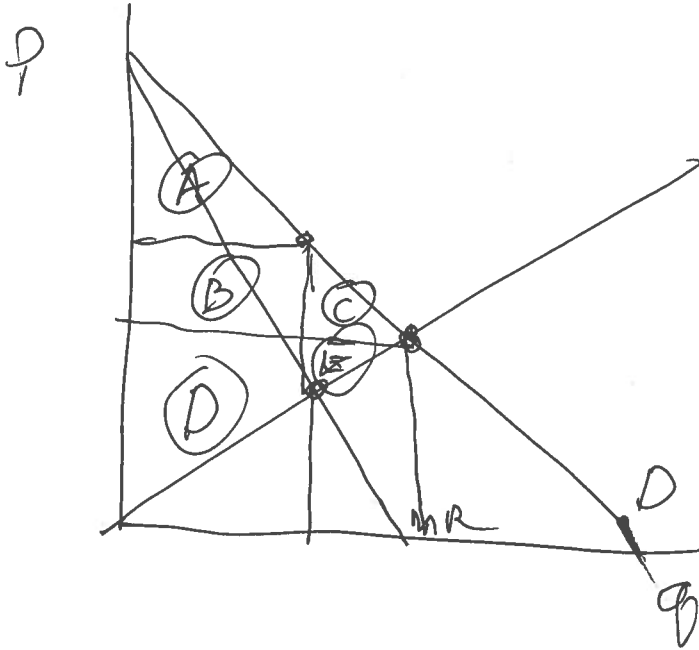
(B) $\pi(Q=2) = 2 \cdot 14 - 39$
 $= 28 - 39$
 $= -11$

better off with $Q=0$ and $\pi = -10$

$Q=0$

13) 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.



$$CS^{PC} = A + B + C$$

$$PS^{PC} = D + E$$

$$CS^M = A$$

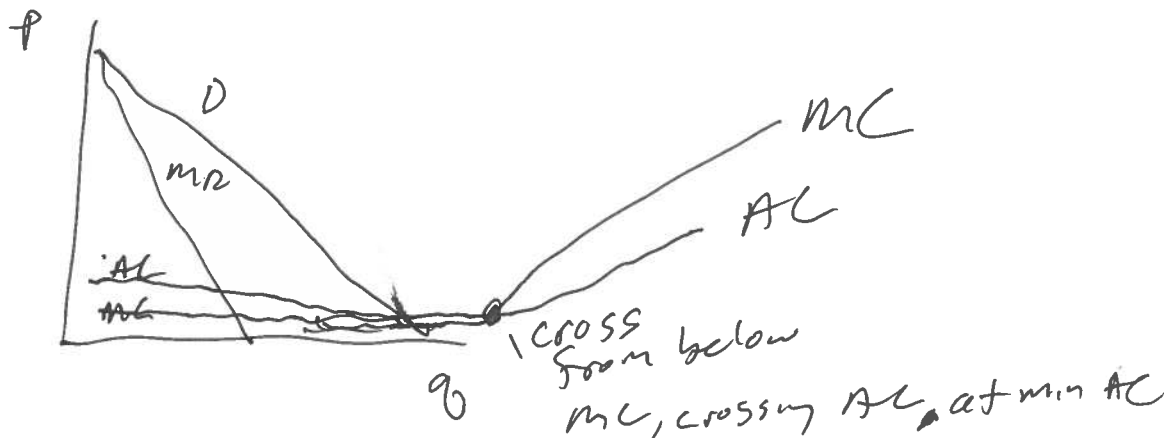
$$PS^M = B + D$$

$$DWL^M = C + E$$

- b. What is a natural monopoly?

A single seller of a good for which there is no close substitute (monopoly definition) which has MC below AC over the feasible range of demand,

to illustrate (optional)

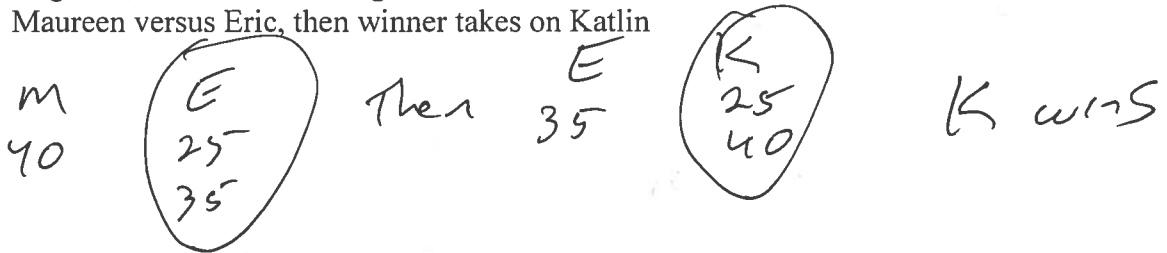


14) The faculty of the PAIA department have brought in three candidates for a public management position, Katlin, Maureen, and Eric. Katlin is the most international in her research agenda and appeals to the international relations / Security oriented faculty, and their second choice is Eric. Maureen is a management scholar, and appeals to the management faculty, who have as a second choice Katlin. Eric is the most quantitative and appeals to the econ and stats faculty who have as a second choice Maureen.

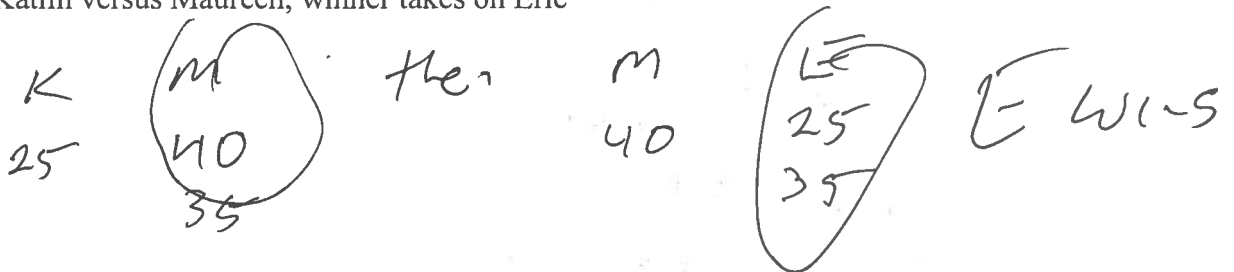
Preferences over Candidates				
	First Choice	Second Choice	Third Choice	Percent of the vote
IR / Security	Katlin	Eric	Maureen	25%
Management	Maureen	Katlin	Eric	40%
Econ and Stats	Eric	Maureen	Katlin	35%

For each agenda, describe the voting in each round and the final outcome.

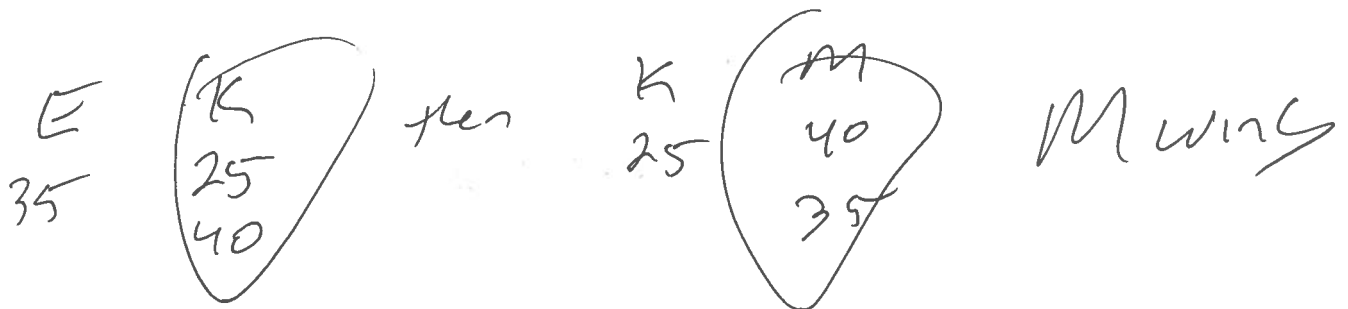
a. Maureen versus Eric, then winner takes on Katlin



b. Katlin versus Maureen, winner takes on Eric



c. Eric versus Katlin, winner takes on Maureen



15) 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 housing market.

Sellers have information buyers do not have. Information is a key part of the definition of a perfectly competitive market.

Policy: Mandatory disclosure / licences for housing inspectors

b. The adverse selection problem in selling people health insurance.

Those most likely to use health insurance are most interested in buying it and those who don't need it as much are less likely to buy.

Policy: Mandatory coverage for all

c. The positive externality conferred on neighboring properties when an individual homeowner improves a property.

The Marginal External Benefit (MEB) is not reflected in the market.

A subsidy to homeowners by state/local government

d. The negative externality imposed on society by a private firm emitting particulate matter as a by-product of production.

Marginal cost of the externality not reflected in the market price outcome.

A Pigouvian tax on the product as a specific tax on producers of size $mce(q^{so}) = T$ would solve the problem.