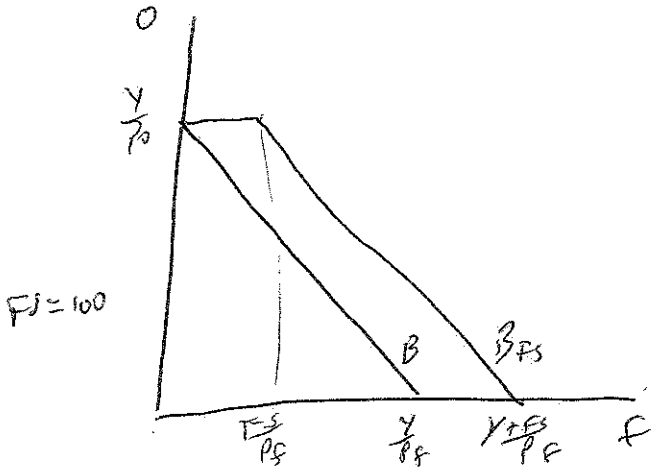
Final
PAI 723, Fall 2014

Name: Key

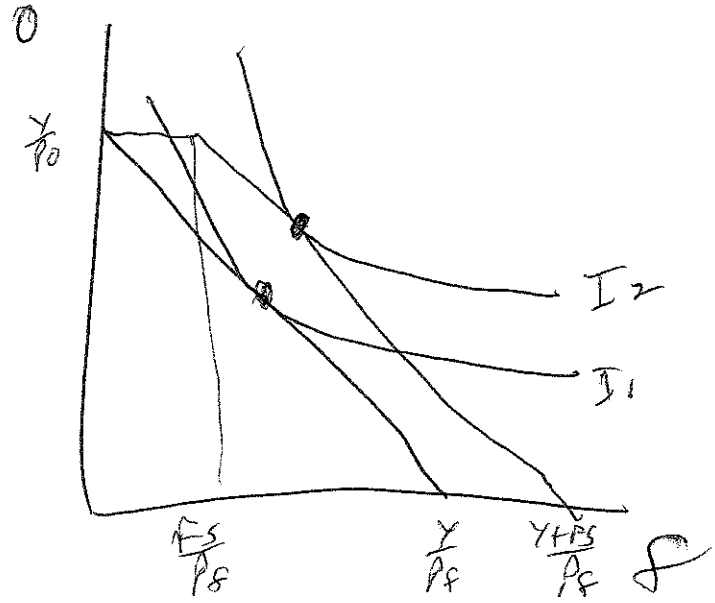
The total final is worth 30 points. Each question is worth 2 points, and each sub question is worth an equal share of the 2 points.

1) A food stamp policy is put in place in a state. For our representative consumer impacted by this policy, their initial income of Y is supplemented by food stamps worth $100. 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.

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

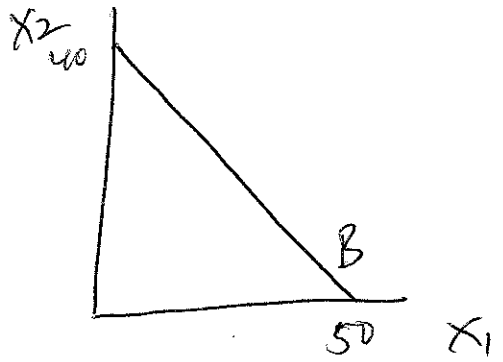


b. Reproduce your graph for (a), and then place on the graph indifference curves for a consumer who is made **equally well off** if we give the consumer $100 in food stamps or $100 in cash.

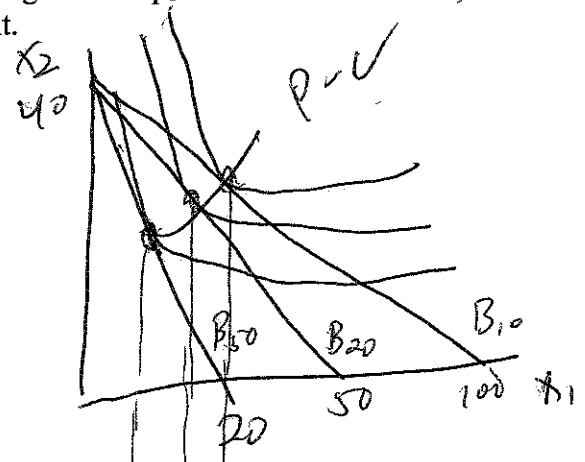


2) If $p_1 = 20$, $p_2 = 25$, and $Y = 1000$

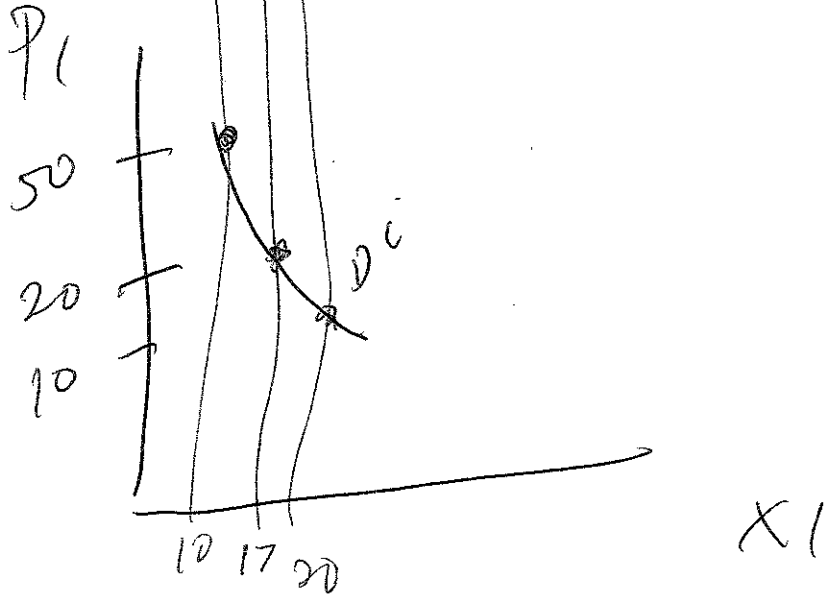
a. Draw the budget constraint.



b. Show how you can derive the price consumption curve for a given consumer's preferences (drawn as you like so long as they obey the properties of indifference curves discussed in class) using the example of the budget line from (a) with $p_1 = 10$, a budget line if $p_1 = 20$ all else constant, and a budget line of $p_1 = 50$ all else constant.



c. Show how to derive the individual's demand curve from the graph in (b).



3) Circle the correct answer

Condition A	Condition B	What type of condition is B - for establishing A?
MC is below AC at q	AC is downward sloping at q	N, NS S, NN N,S
The good is homogeneous	The market is perfectly competitive	N, NS S, NN N,S
The market is perfectly competitive	Price taking behavior by buyers and sellers	N, NS S, NN N,S
Consumption of the good is characterized by rivalry.	The good is a private good	N, NS S, NN N,S
The good is a public good.	The good is characterized by non-exclusion	N, NS S, NN N,S
The Nash Equilibrium is not economically efficient.	The Nash Equilibrium is not a Pareto optimal outcome	N, NS S, NN N,S
A quantity is the profit maximizing quantity	The quantity is produced in a technologically efficient way.	N, NS S, NN N,S
The last dollar rule is satisfied at a bundle	MRS=MRT at a bundle	N, NS S, NN N,S

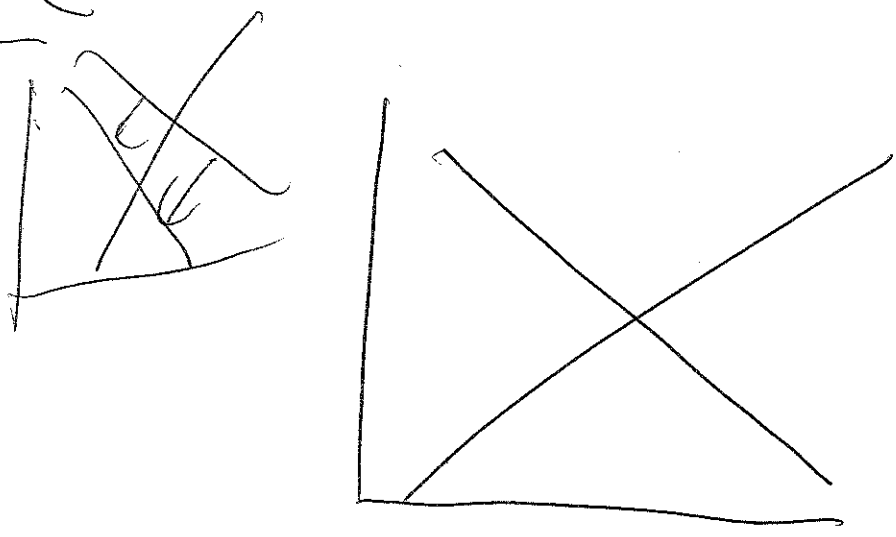
N,NS : Necessary, not sufficient
S, NN: Sufficient, not necessary
N, S: Necessary and sufficient.

down

4) The average price of a gallon of gas has come dramatically 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.

P↓

Explanation	Rule out	Not Rule Out (circle)
Incomes in Central New York have increased since last year.	Rule out	Not Rule Out
Federal fuel efficiency guidelines have increased the miles per gallon the average car drives by 15% over the past year.	Rule out	Not Rule Out
Hydrofracking has increased US production levels of crude oil dramatically over the past year.	Rule out	Not Rule Out
New environmental regulations make it more costly to refine oil into gasoline.	Rule out	Not Rule Out
ISIS political instability has dramatically reduced Middle East oil production over the past year, impacting global markets.	Rule out	Not Rule Out
Slowing growth in China and India over the past year has reduced energy demand in these countries over what was seen in years past.	Rule out	Not Rule Out

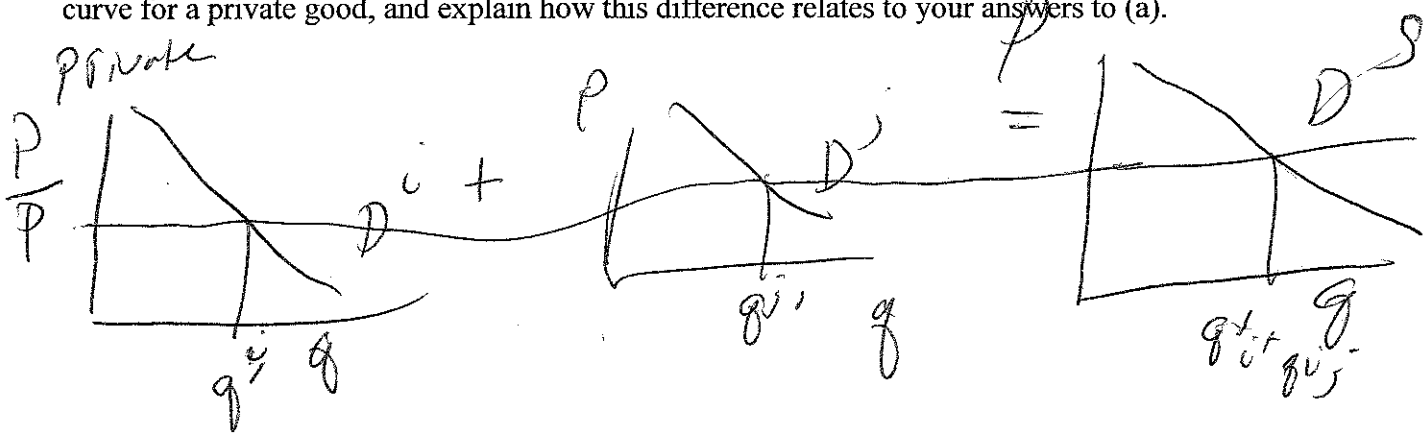


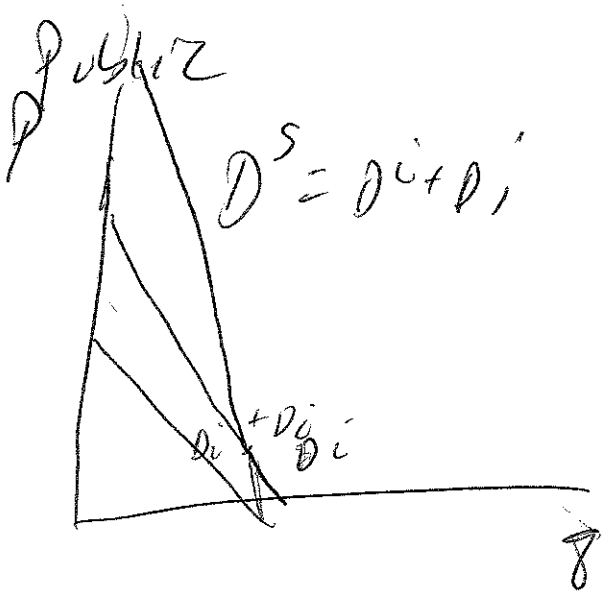
5) Types of Goods.

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 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).





public is non rival so added up MPB for given q. public is non excludable so add up over all members of society

6) 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	27	17	17	10	27	17
2	10	41	31	31/2 15½	5	20½	14
3	10	56	46	4⅓ 15⅓	3⅓	19⅔	15
4	10	73	63	63/4 15¾	2½	18¼	17
5	10	95	85	85/5 17	2	19	22

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

SR, FC 70

c. If market price for the output produced is 15, what level of output is profit maximizing for a firm if the market structure is perfectly competitive?

$\pi(q=0) = 0 - 10 = -10$

$\pi(q=3) = 15 \cdot 3 - 56 = 45 - 56 = -11$

0 better than 3

- or +

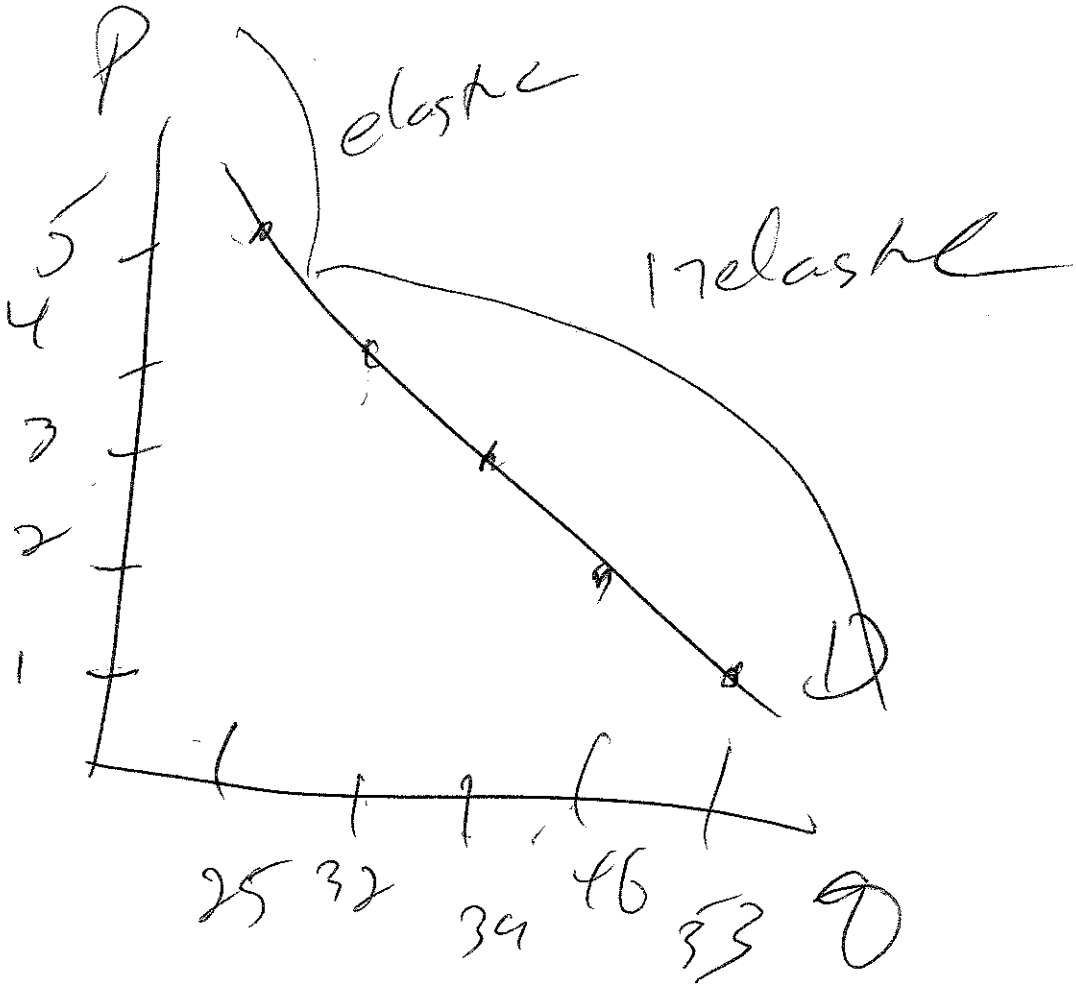
$P = MR =$ mc at $q = 3$ but $P = 15$ is below AVC $(q=3)$ so shut down

7) The demand curve is given to you as q=60-7*p.

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

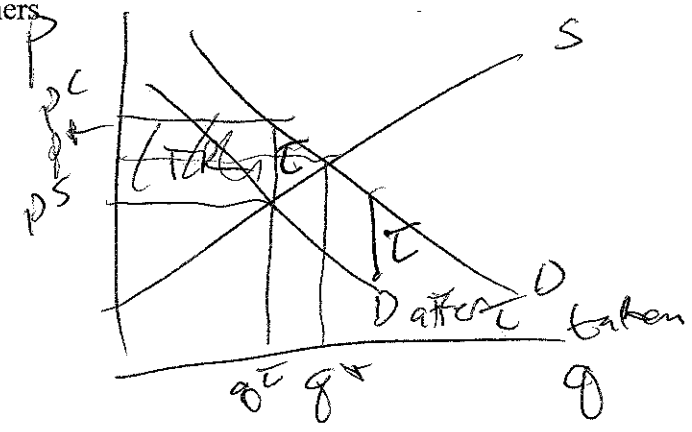
Price	Quantity	Elasticity
1	53	----------
2	46	$-7\left(\frac{2}{46}\right) = -\frac{14}{46} = -.30$
3	39	$-7\left(\frac{3}{39}\right) = -\frac{21}{39} = -.538$
4	32	$-7\left(\frac{4}{32}\right) = -\frac{28}{32} = -.875$
5	25	$-7\left(\frac{5}{25}\right) = -\frac{35}{25} = -1.4$

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.

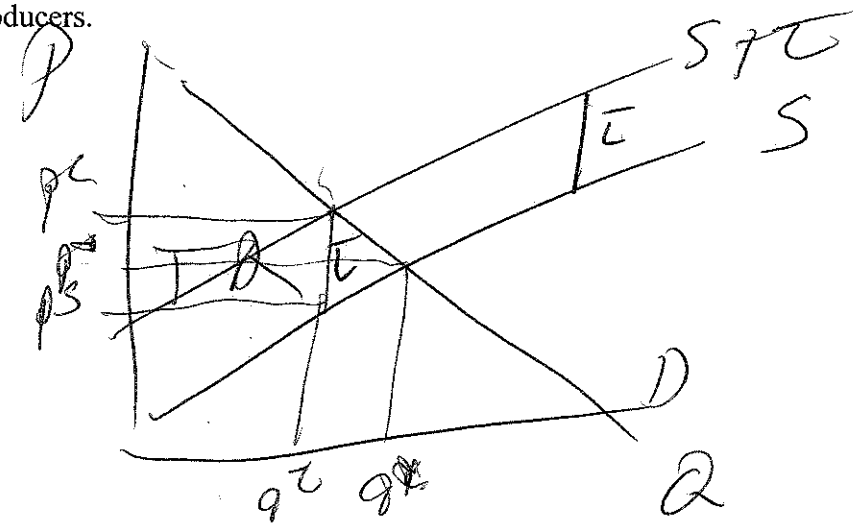


8) Tax policy.

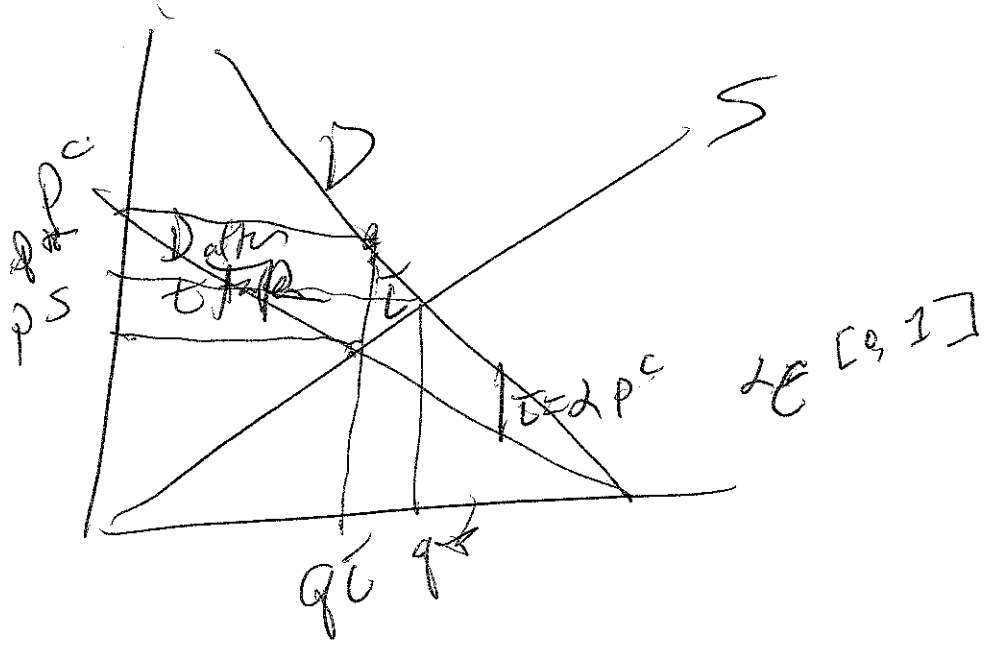
a. Illustrate on a supply and demand graph a specific tax of size τ placed on consumers.



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



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



9) Benefit Cost. Currently there is a ban on using controlled burning on rangelands in southern Ethiopia as a means to control bush encroachment. A policy to relax this ban has been proposed. The reason the ban exists is these fires that start under control can get out of control and lead to property damage. Damages from out of control fires is estimated to cost 1.5 million dollars per year. The benefit when burning is allowed is prevented loss of grazing land to bush encroachment combined with expansion of grazing land lost to past encroachment. This gain in rangeland productivity if burning is allowed due to increased productivity of livestock is equal to 0.5m in year zero, 1.5 m in year one, 2 m in year two , and 2 million in year three.

a. Does NPV indicate we should relax the ban using a discount rate of 10%?

	Benefits	Costs	
T=0	.5	1.5	-1
T=1	$1.5/1.1$	$1.5/1.1$	0
T=2	$2/1.1^2$	$1.5/1.1^2$	$\frac{.5}{1.1^2}$
T=3	$2/1.1^3$	$1.5/1.1^3$	$\frac{.5}{1.1^3}$

NP NPV = -0.211

b. Is the answer the same if we allow sale of charcoal resulting from the burn worth 1 m dollars in years zero, one, two, and three but this will increase our training costs by 2 million dollars in year zero and 1 million in year one (still with r=10%)?

	Benefits	Costs	
T=0	$.5+1$ 1.5	$1.5+2$ 3.5	-2
T=1	$1.5+1/1.1$	$1.5+1/1.1$	0
T=2	$2+1/1.1^2$	$1.5/1.1^2$	$1.5/1.1^2$
T=3	$2+1/1.1^3$	$1.5/1.1^3$ 1.12692	$1.5/1.1^3$

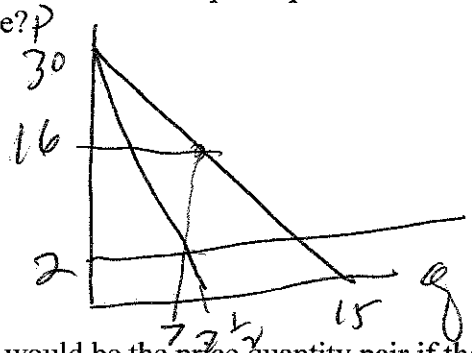
2.3666 - 2 = .3666

10) Circle the correct answer.

Statement	**The statement is (circle the correct answer)**
Income elasticity for a normal good is positive.	True False
Producer surplus is calculated as the area under the demand curve and above the price line.	True False
In the short run at a given q, AC(q)>AVC(q).	True False
The slope of the budget line is defined by the negative ratio of the prices of the goods.	True False
Cross price elasticity for substitutes is a positive number.	True False
The slope of the indifference curve is called the Marginal Rate of Substitution.	True False
A monopsonist is the single buyer of a good for which there are many sellers.	True False
A supply elasticity is the % change in price divided by the % change quantity supplied.	True False

11) You know that the demand curve is defined by the following function: P=30-2Q.

a. If total cost is defined by 2*Q, then MC= 2 for all possible levels of Q. What level should the monopolist produce at and what price per unit should they charge?



$30-4q = 2$

$28 = 4q$

$q = 7$

$P = 30-14 = 16$

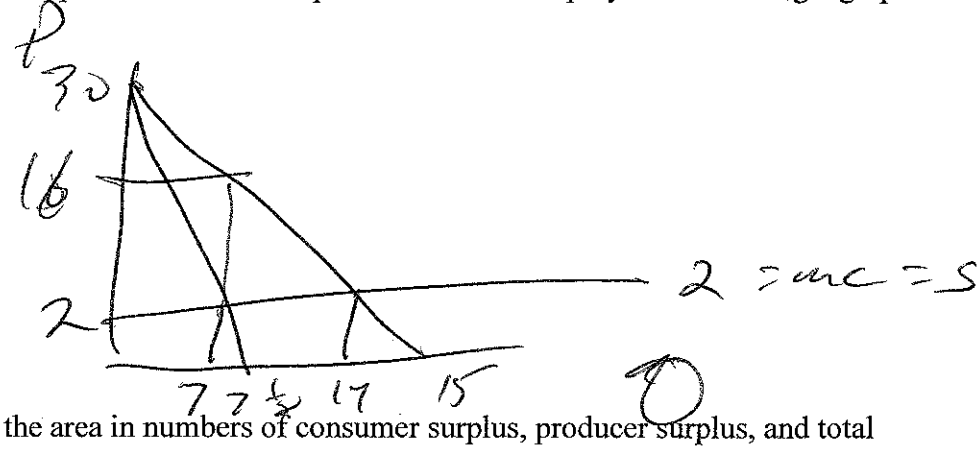
b. What would be the price quantity pair if the competitive market had identical cost structures to the monopoly firm (MC=2) and the demand curve was unchanged?

$30-2q = 2$

$28 = 2q$

$q = 14 \quad P = 2$

c. Show the competitive case in comparison to the monopoly case on a single graph.



d. Calculate the area in numbers of consumer surplus, producer surplus, and total social welfare under the competitive and the monopoly structure.

	Competitive Market Structure	Monopoly Market Structure
Consumer Surplus	$28 \cdot 14 \cdot \frac{1}{2}$ 196	$\frac{1}{2} 14 \cdot 7$ 49
Producer Surplus	0	$14 \cdot 7$ 98
Total Social Welfare	$7 \cdot 28$ 196	147

12) Game Theory.

In Syracuse, each resident is responsible for shoveling the snow in front of their house within 24 hours after a storm. Sandy and Rocky are two neighbors who find themselves in the following situation. Each has to cross their own and their neighbor's sidewalk to get to a bus stop to go to work in the morning (different bus stops). If they shovel, it takes them 3 minutes to shovel in front of their house. It takes 30 seconds to walk across a shoveled sidewalk, 2 minutes and 30 seconds to walk across a not shoveled sidewalk. If both shovel, they each spend 3 minutes shoveling and 30 seconds crossing each of two sidewalks for a total of 4 minutes. If your neighbor shovels and you don't, your neighbor spends 3 minutes shoveling, 30 seconds crossing their own sidewalk, and 2 minutes and 30 seconds crossing yours for a total of 6 minutes. You in contrast spend 3 minutes, 30 seconds crossing theirs and 2 minutes and 30 seconds crossing your own. If neither shovels, it takes 5 minutes to get to the bus stop for each (2:30 crossing each of two not shoveled sidewalks).

		Rocky			
		Shovel		Don't Shovel	
Sandy	Shovel	4	4	6	3
	Don't Shovel	3	6	5	5

a) What is the full set of best response strategies in this game?

If R S, S DS
If R DS, S DS
If S S, R DS
If S DS, R DS

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

R DS, S DS (5,5)

c) Is there a Pareto improving outcome to this game compared to the Nash Equilibrium? If so, in what sense is it Pareto improving? If not, why not?

If both could be compelled to shovel, both would be better off as only 4 minutes total as opposed to the 5 minutes total now. Pareto

13) Externalities. The inverse demand curve is given as p=100-q. The supply curve is p=10+2q.

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

$100 - q = 10 + 2q$

$90 = 3q$

$q = 30$

$p = 70$

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?

$100 - q = 10 + 2q + 2q$

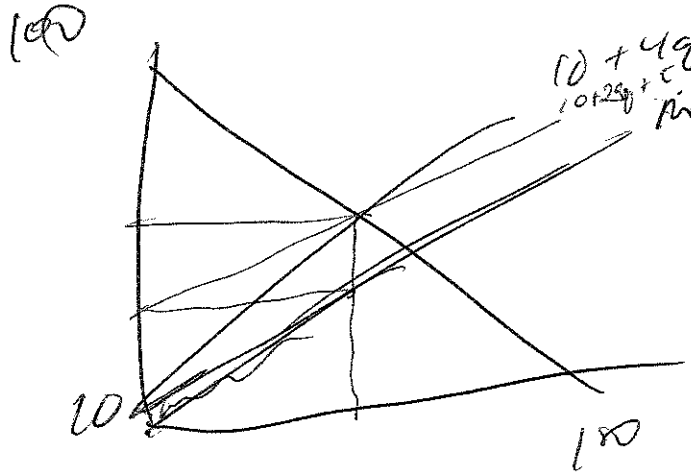
$90 = 5q$

$q = 18$

$p = 82$

c. What specific tax τ could be placed on the producers in the perfectly competitive market to arrive at the socially optimal price quantity pair?

$2 = q^{50} = 2.36 = 36$



$82 = 10 + 2(18) + \tau$

$82 = 46 + \tau$

$\tau = 36$

14) Public goods. There are three people who live in a town. They each have a demand curve for the number of bales of hay to put in front of the light poles at the bottom of the sledding hill (to soften the impact of crashing into the light poles after sledding down the hill). Jessie's demand is 8-q. Danny's demand is 20-2q. Joey's demand is 8-2*q.

a. If the marginal cost of a bale of hay is $10 and no effort is made to avoid the free rider problem, what number of hay bales will be provided and who will provide it?

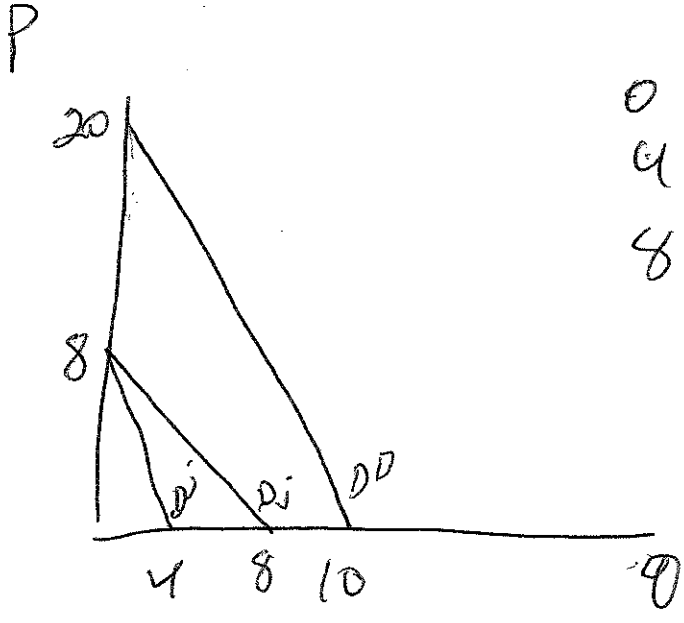
Danny.

$20 - 2q = 10$

$2q = 10$

$q = 5$

b. How much less is this than the socially optimal number of hay bales if the price of a bale of hay is $10?



0 to 4 $36 - 5q$ 36 to 16

4 to 8 $28 - 3q$ 16 to 4

8 to 10 $20 - 2q$ 4 to 0

$28 - 3q = 10$

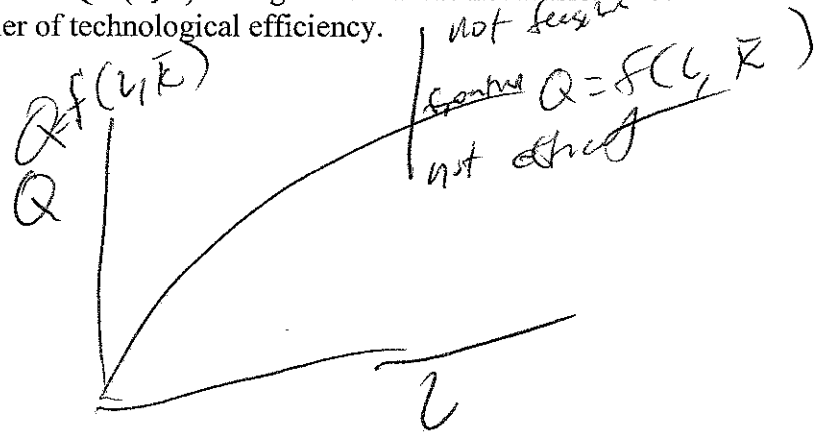
$11 = 3q$

$q = 6$

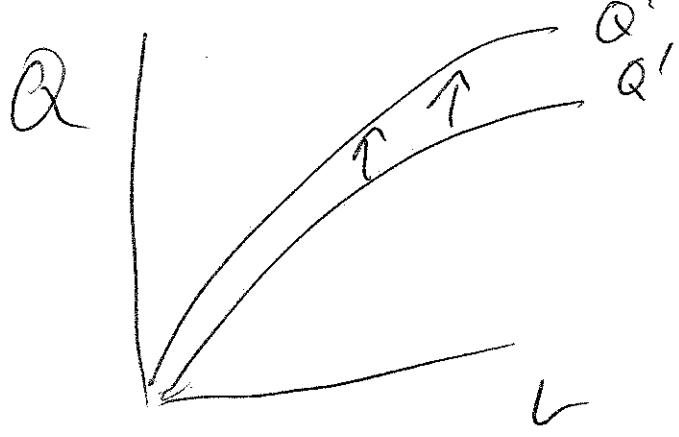
1 fewer

15) Production functions

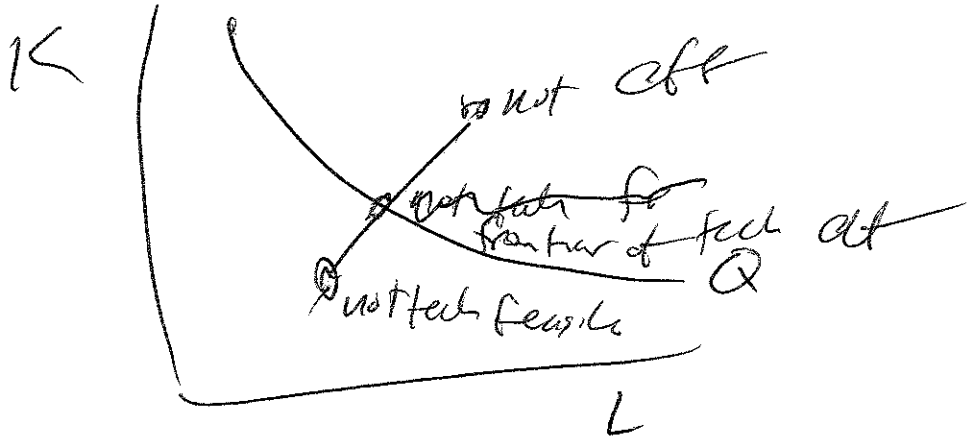
a. Draw the production function $Q=f(\bar{L}, K)$ noting areas that are not feasible, not efficient and at the frontier of technological efficiency.



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



Work Page