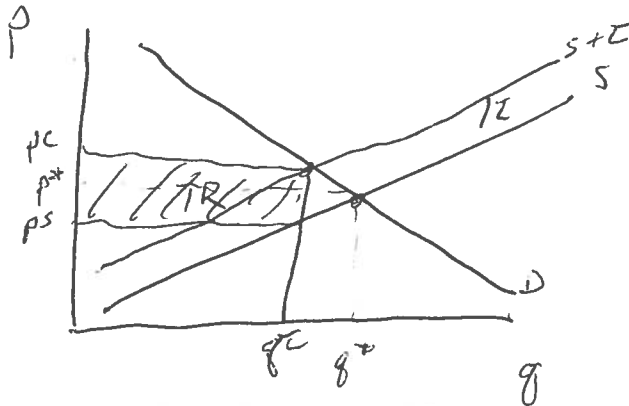


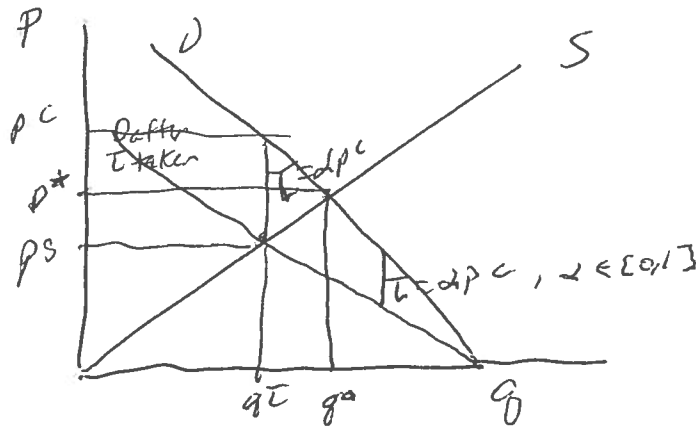
The total exam is worth 25 points. Each numbered question is worth 2 1/2 points, and each sub question within a numbered question is worth an equal share of the 2 1/2 points.

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

The share of the tax burden that comes in the form of a higher price paid by consumers compared to the price paid before the tax was imposed is divided by the size of the tax.

$$C.I. = \frac{p_c - p_s}{\tau}$$

2) The own price demand elasticity was given in the lecture notes for some goods and services:

	Short Run	Long Run
Gasoline	-0.2	-0.5
HH Electricity	-0.1	-1.9
Air Travel	-0.1	-2.4
Intercity bus travel	-2.0	-2.2

a. Write in the cell whether the own price demand elasticity for each item is: infinitely inelastic, unit inelastic, inelastic, perfectly inelastic, elastic, unit elastic, or infinitely elastic?

	Short Run	Long Run
Gasoline	inelastic	inelastic
HH Electricity	inelastic	elastic
Air Travel	inelastic	elastic
Intercity bus travel	elastic	elastic

b. If I wanted to raise revenue by imposing a tax that raises the price of one of these by 10%, in the long run which good or service will have the largest % reduction in quantity demanded brought about by the imposition of the tax? Which one would have the smallest % reduction in quantity demanded?

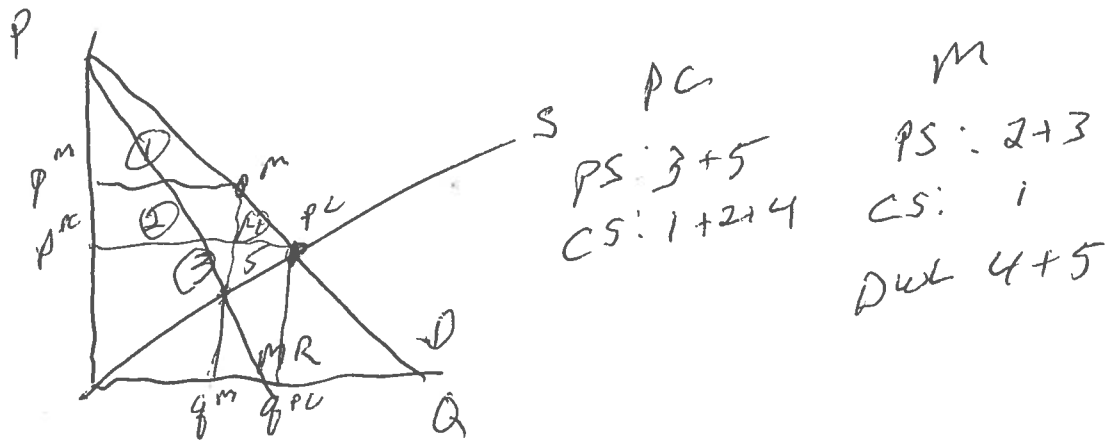
$$E = \frac{\% \Delta Q}{\% \Delta P}$$

LR: Air travel has largest reduction in Q for a 10% change in P since it is the most elastic in the LR

SR: Intercity bus travel has the largest reduction in Q for a 10% ↑ in P since it is the most elastic in the SR

3) 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.



- b. What is a natural monopoly?

When there is a single supplier for a good in a market and for that supplier marginal cost is below average cost over the whole feasible range of demand.

- c. What is the difference between a monopoly and a monopsony?

Monopoly - single seller of a good for which there is no close substitute

monopsony - single buyer of a good

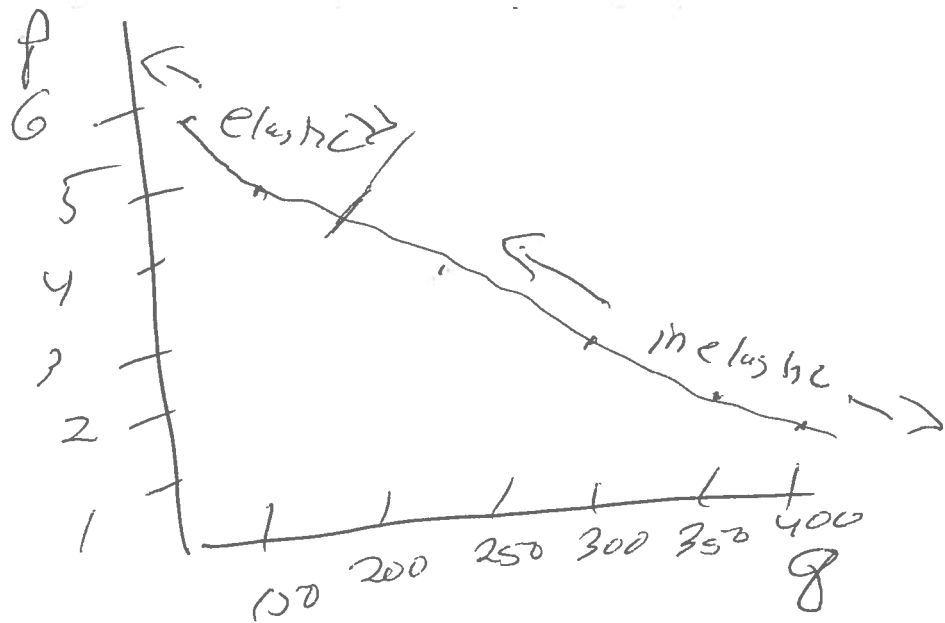
4) The demand curve is given to you as $q=450-50 \cdot p$.

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	400	-----
2	350	$-\frac{50}{1} \cdot \frac{2}{350} = -\frac{100}{350} = -0.29$
3	300	$-\frac{50}{1} \cdot \frac{3}{300} = -\frac{150}{300} = -0.5$
4	250	$-\frac{50}{1} \cdot \frac{4}{250} = -\frac{200}{250} = -0.80$
5	200	$-\frac{50}{1} \cdot \frac{5}{200} = -\frac{250}{200} = -1.25$
6	150	$-\frac{50}{1} \cdot \frac{6}{150} = -\frac{300}{150} = -2.00$

$$E = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}}$$

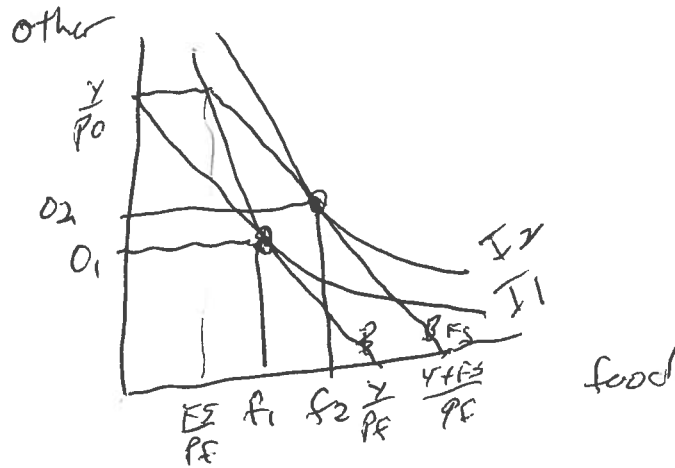
b. Draw this demand curve with price on the y-axis and quantity on the x-axis. Identify the range over which this curve is elastic or inelastic.



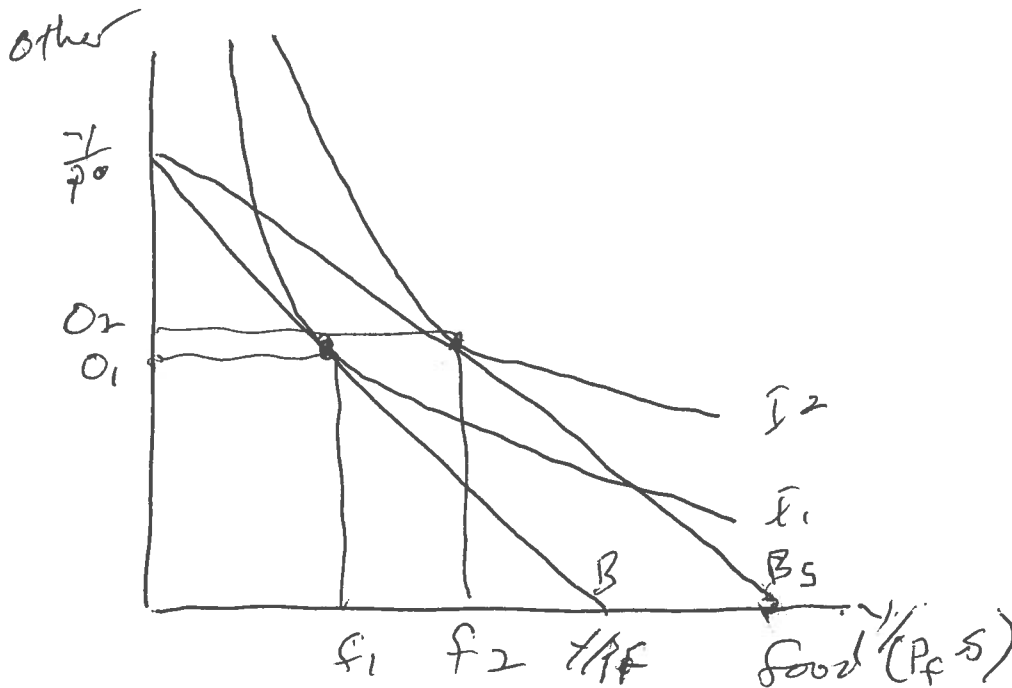
5) Circle the correct answer.

Statement	The statement is (circle the correct answer)	
Real values are expressed in inflation adjusted units.	<input checked="" type="radio"/> True	<input type="radio"/> False
Producer surplus is calculated as the area below the demand curve and above the price line.	<input type="radio"/> True	<input checked="" type="radio"/> False
With regard to income inequality, the higher the Gini coefficient the higher the degree of inequality.	<input checked="" type="radio"/> True	<input type="radio"/> False
Increasing the discount rate decreases the present value of future benefits.	<input checked="" type="radio"/> True	<input type="radio"/> False
The internal rate of return is the value of r at which present value benefits equal present value costs for a project.	<input checked="" type="radio"/> True	<input type="radio"/> False
Economic efficiency is achieved when a market arrives at a Pareto optimal outcome.	<input checked="" type="radio"/> True	<input type="radio"/> False
The cross price elasticity for a substitute is a negative number.	<input type="radio"/> True	<input checked="" type="radio"/> False
An open access good is excludable and non-rival.	<input type="radio"/> True	<input checked="" type="radio"/> False
The free rider problem leads to over-provision of a public good.	<input type="radio"/> True	<input checked="" type="radio"/> False
A necessary but not sufficient condition for economic efficiency is technological efficiency.	<input checked="" type="radio"/> True	<input type="radio"/> False

- 6) 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 $p_f \cdot f + p_o \cdot o = Y$.
- 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 .



7) 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.

Buyers have knowledge from experience that sellers do not have. Potential for adverse selection problems (lemons) that could undermine market functioning. Policy response: disclosure requirements by sellers and they must allow potential buyers to conduct home inspections.

b. The moral hazard problem in selling people vehicle insurance.

Moral hazard is when the presence of insurance makes use of it more likely by inducing behavioral changes like slamming the teenage girl's car in Fred Green's tank-top. High deductibles are one way to address this.

c. The positive externality conferred to citizens of a country by the provision of national security.

National security protects all and is non-rival (your use does not prevent mine) and non-excludable (protection to all citizens). As such it is a public good and governments provide this public good. Mandatory service for 2 years for all.

d. The negative externality imposed on society by secondhand smoke from consumption of the private good of a cigarette.

The behavior of the smoker does not only confer enjoyment to the private consumption of the smoker, but also negative harm to those bothered by the smoke around the smoker and possibly to all of society in the form of higher future health care costs for the smoker and possibly those exposed. Ban smoking in public places.

8) Benefit cost.

We are comparing two policies to reduce CO₂ emissions in our country. Both policies under consideration provide a flow of health benefits over the next four years (t=0,1,2,3) that are equal to 5 million in present value through reduced pollution. In addition, both policies lead to an increase in carbon sequestration that provides revenues from the sale of carbon credits on international markets of 2 million each year for t=1, t=2, and t=3.

The 'vehicle' policy option would be a four year (t=0, t=1, t=2, t=3) program that would cost 4 million in t=0, 3 million in t=1, 2 million in t=2, and 2 million in t=3. This would replace all vehicles in the country over ten years old and replace them with lower emission vehicles.

The 'industry' policy option would be a four year (t=0, t=1, t=2, t=3) program that would cost 7 million in t=0, 2 million in t=1, 1 million in t=2, and 1 million in t=3.

a) If the discount rate is 10%, which policy is a better option in net present value terms?

Vehicle

	B	C	
t=0	5	4	1
t=1	2/1.1	3/1.1	-1/1.1
t=2	2/1.1 ²	2/1.1 ²	0
t=3	2/1.1 ³	2/1.1 ³	0

$1 - \frac{1}{1.1}$

Industry

	B	C	
t=0	5	7	-2
t=1	2/1.1	2/1.1	0
t=2	2/1.1 ²	1/1.1 ²	1/1.1 ²
t=3	2/1.1 ³	1/1.1 ³	1/1.1 ³

$-751 + 226 = -525$
NPV = -0.422

Vehicle better option → NPV = 0.09

b) Note that the sum of the benefits, the sum of the costs for 'vehicle' and the sum of the costs for 'industry' each add up to 11 million over four years. Explain how the pattern of benefits and costs over time plus the role of discounting allowed you to select one option over the other in part (a).

For vehicle, the costs are more evenly spread over time than they are for industry. For industry, more of the cost is in year zero, and undiscouted. Also, net benefits for industry are in years 2+3 and will be discounted to be less than the -2 NPV in year zero when added up.

UP =

9) Market structure and externalities. The inverse demand curve is given as $p=116-4q$. The supply curve is $p=20+4q$.

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

$$116 - 4q = 20 + 4q$$

$$\begin{array}{r} 116 - 4q = 20 + 4q \\ -20 \quad -20 \\ \hline 96 - 4q = 4q \\ +4q \quad +4q \\ \hline 96 = 8q \end{array}$$

$$96 = 8q$$

$$q = 12$$

$$p = 68$$

$$(p^{pc}, q^{pc}) = (68, 12)$$

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

$$MC^S = MC^P + MC^E = (20 + 4q) + (4q) = 20 + 8q$$

$$116 - 4q = 20 + 8q$$

$$\begin{array}{r} 116 - 4q = 20 + 8q \\ -20 \quad -20 \\ \hline 96 - 4q = 8q \\ +4q \quad +4q \\ \hline 96 = 12q \end{array}$$

$$96 = 12q$$

$$q = 8$$

$$p = 84$$

$$(p^{so}, q^{so}) = (84, 8)$$

- c. If the market structure is a monopoly, what is the equilibrium price quantity pair chosen by the monopolist (who does not include MC^E in her decision)?

$$MR = 20 + 8q$$

$$116 - 4q = 20 + 8q$$

$$96 = 12q$$

$$q = 8$$

$$P = 84$$

$$(P^m, q^m) = (84, 8)$$

- d. Contrast your answers to parts b and c and explain this result.

- In the presence of a negative externality a PL market produces too much at too low a price
- A monopolist produces less at a higher price per unit than will be obtained in a perfectly competitive market,
- These two forces could offset, leading the monopolist outcome to in fact be the socially optimal outcome
- This can but does not have to be the case as socially optimal and monopoly outcome could differ in other cases.

10) Public goods. There are three people who live in a town. They each have a demand curve for the number of flowers to be planted in the town square (q is the # of flowers). Fran's demand is $\$5.50 - \$0.10 \cdot q$. Eloise's demand is $\$3.20 - \$0.40 \cdot q$. Maline's demand is $\$3.25 - \$0.15 \cdot q$.

- a. If the marginal cost planting a flower is constant at $\$4.80$ per flower and no effort is made to avoid the free rider problem, what number of flowers will be planted and who will provide these flowers?

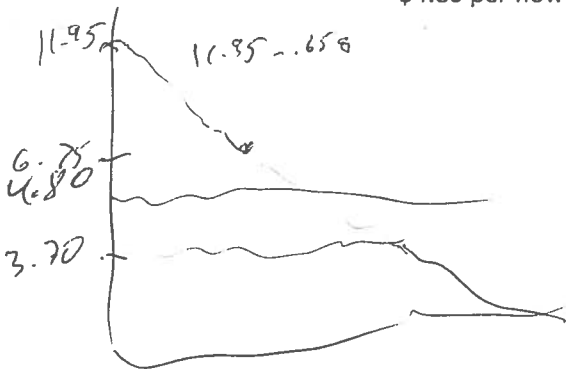
$F: 5.50 - .10q$
 $E: 3.20 - .40q$
 $M: 3.25 - .15q$

$11.95 - .65q$
 $8.75 - .25q$

$MC = 4.80$
 $5.50 - .10q = 4.80$
 $.70 = .10q$
 $7 = q$

Fran will provide

- b. How much less is this than the socially optimal number of flowers if the cost is $\$4.80$ per flower?



$8.75 - .25q = 4.80$

$3.95 = .25q$

15.8
not

$(11.95 - .65q = 4.80)$

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

Since it is non rival, benefits are shared so you vertically sum WTP.
 Private it is rival so you add up quantities.
 Private is excludable so you add up at a given price all who have a demand.
 Public is not excludable so add for all members who have a WTP at a given quantity.

WTP E
 $3.20 - .40(11)$
 $= 2.80$

Work Page: