ECON 101 – Answers to Exam 2
November 10, 2008

Part 1. Multiple Choice

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1 c See p.163, definition and italicized passage. Choices a and b are incorrect because, while the tax certainly does reduce CS and PS, it raises some revenue, which adds to total surplus. The reason for the dead-weight loss is that the revenue isn't enough to compensate for the losses to consumers and producers. Choice d is incorrect because the tax causes government revenue to rise, not fall.

2 b On p.166, Figure 5 panels (c) and (d) show that DWL is lower when demand is inelastic than when it's elastic. See p.165 "The determinants of the dead-weight loss" for more info.

3 c See "the jobs argument" on p.188,p.190 and notes from class.

4 b Definition. See p.210.

5 a Whenever there's a positive externality, the market quantity is less than the quantity that maximizes social welfare. See "positive externalities" (p.207) for more info.

6 b Definition of common resources. See p.225.

7 a Public goods are not excludable – you can't prevent people from using them. Therefore, most people will be "free riders," they will enjoy the good without paying for it. No firm would be willing to provide a good that people can consume without paying for.
For more information, see "The Free-Rider Problem" on p.226.

8 c A congested road is a common resource (see p.232). The others are public goods (see "Some Important Public Goods" on pp.226-228).

9 d See p.231 for the parable and the marginal definition of "Tragedy of the Commons."

10 c To see why "c" is correct, see "Conclusion: The Importance of Property Rights" on p.236. Choices a and b are incorrect because the market doesn't care about social benefits, it cares only about private benefits (the benefits to those who pay for the good). This is why, for example, the market underprovides goods with positive externalities, such as flu shots – because private parties (buyers and sellers) only take into account the costs and benefits <u>they</u> face, not the benefits to society from having a flu-free population.

11 d Nevada Power spends $200 per ton of emissions reduction, and it must reduce emissions from 70 to 30, a drop of 40. $200 per ton times 40 = $8000.

12 d Using the same reasoning, Edison spends $6000 on abatement and WE spends $1000 on abatement. The table shows that DTE spends $2000 and we previously found that Nevada Power spends $8000. So, total cost of abatement = $6000 + 1000 + 2000 + 8000 = $17,000.

13 b In this scenario, Nevada Power has 60 permits (the initial 30 it was given, and the 30 it purchased), so it can generate 60 tons of pollution without penalty. So it only has to reduce emissions by 10 tons (from 70 to 60). That will cost Nevada Power $2000, which equals 10 tons of abatement times $200 abatement cost per ton.

14 c To get the answer, first calculate each firm's abatement costs, then sum them up. We previously found Nevada Power's costs to be $2000. Similarly, we find DTE spends $5000 on abatement (it has no permits, so it must reduce emissions by 50 tons, at a cost of $100 per ton), WE spends $4000 (it has no permits so must abate all 40 tons at a cost of $100 per ton), and Edison spends $0 on abatement (it uses the 30 permits it was given plus the 30 it purchased, so it needn't reduce its emissions at all). The total cost is the sum of these figures: $5000 + 0 + 2000 + 4000 = $11,000.

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Part 2. Problems, Applications, and Short-Answer Questions

1. Costs

Fill in the empty spaces of the table below with the missing values.

Q	VC	TC	AFC	AVC	ATC	MC
0	**$0**	$50	*n/a*	*n/a*	*n/a*	
1	10	**60**	**$50.00**	$10	$60.00	$10
2	30	80	**25.00**	**15**	**40.00**	**20**
3	**60**	**110**	16.67	20	36.67	30
4	100	150	12.50	**25**	37.50	**40**
5	150	**200**	**10.00**	30	**40.00**	**50**
6	210	260	8.33	35	43.33	60

Finding VC:
At Q = 0, VC = 0. Firms don't hire any workers or buy any materials if they aren't producing anything. At Q = 3, the table tells us AVC = 20. We know that AVC = VC/Q, so VC has to equal 60.

Finding TC:
There are two ways to find TC at Q = 3. First, TC = FC + VC = $50 + $60 = $110.
Second: The table gives us ATC = 36.67 at Q = 3. Since ATC = TC/Q, then TC = ATC * Q = 36.67 x 3.
When Q = 5, we can find TC = FC + VC = $50 + 150 = 200.

Finding AFC:
The problem tells us FC = 50. By definition, AFC = FC/Q. So, for each missing value of AFC, simply divide $50 by Q: When Q = 1, AFC = $50/1 = $50. When Q = 2, AFC = $50/2 = $25. and so on.

Finding AVC: Simply use AVC = VC/Q. At Q = 2, AVC = 30/2 = 15. At Q = 4, AVC = 100/4 = 25.

Finding ATC: either use ATC = TC/Q, or use ATC = AFC + AVC.

Finding MC: compute the change in TC when output increases by one unit.
When Q rises from Q=1 to Q=2, TC rises from 60 to 80, an increase of 20.
When Q rises from 3 to 4, TC rises from 110 to 150, an increase of 40. and so on.

2. Effects of a tax

Refer to the graph below, which shows the market for concert tickets.

With no tax, the equilibrium price is $40 per ticket, and the equilibrium quantity is 60 tickets .
In the equilibrium with no tax,

consumer surplus = A + B + G

producer surplus = C + D + H

total surplus = A + B + C + D + G + H

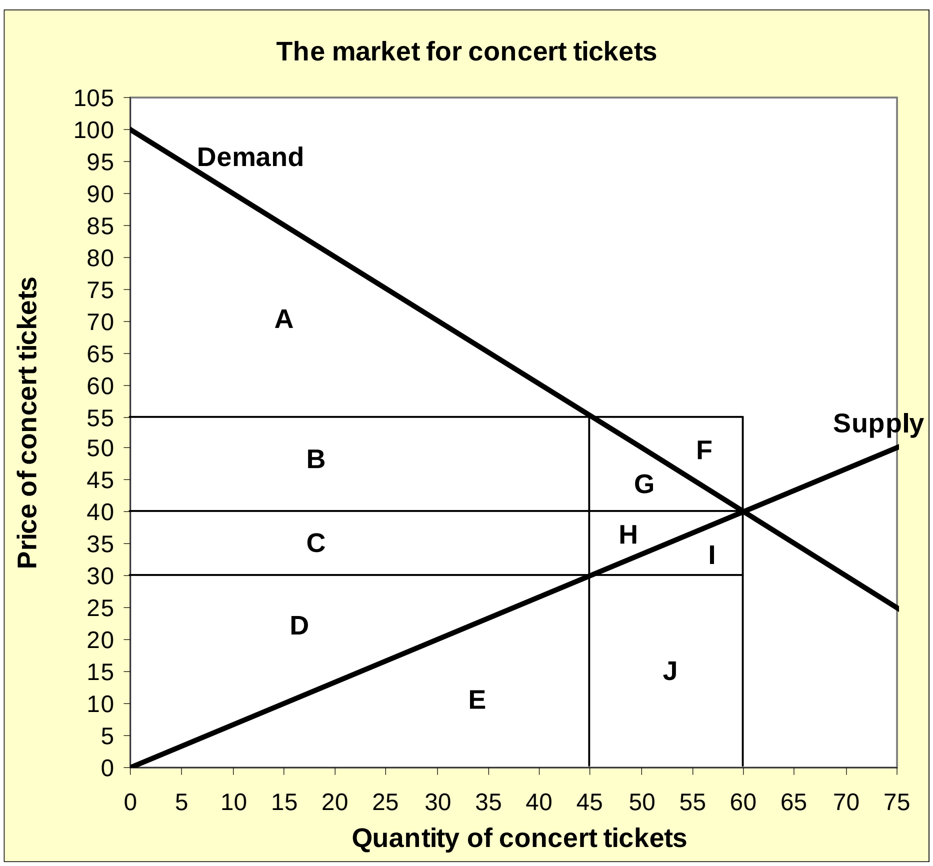
Suppose the government imposes a tax of $25 per ticket. Now, the equilibrium quantity is 45 tickets, and the price buyers pay (including the tax) is $55 per ticket. In the equilibrium with this tax,

consumer surplus = C

producer surplus = D

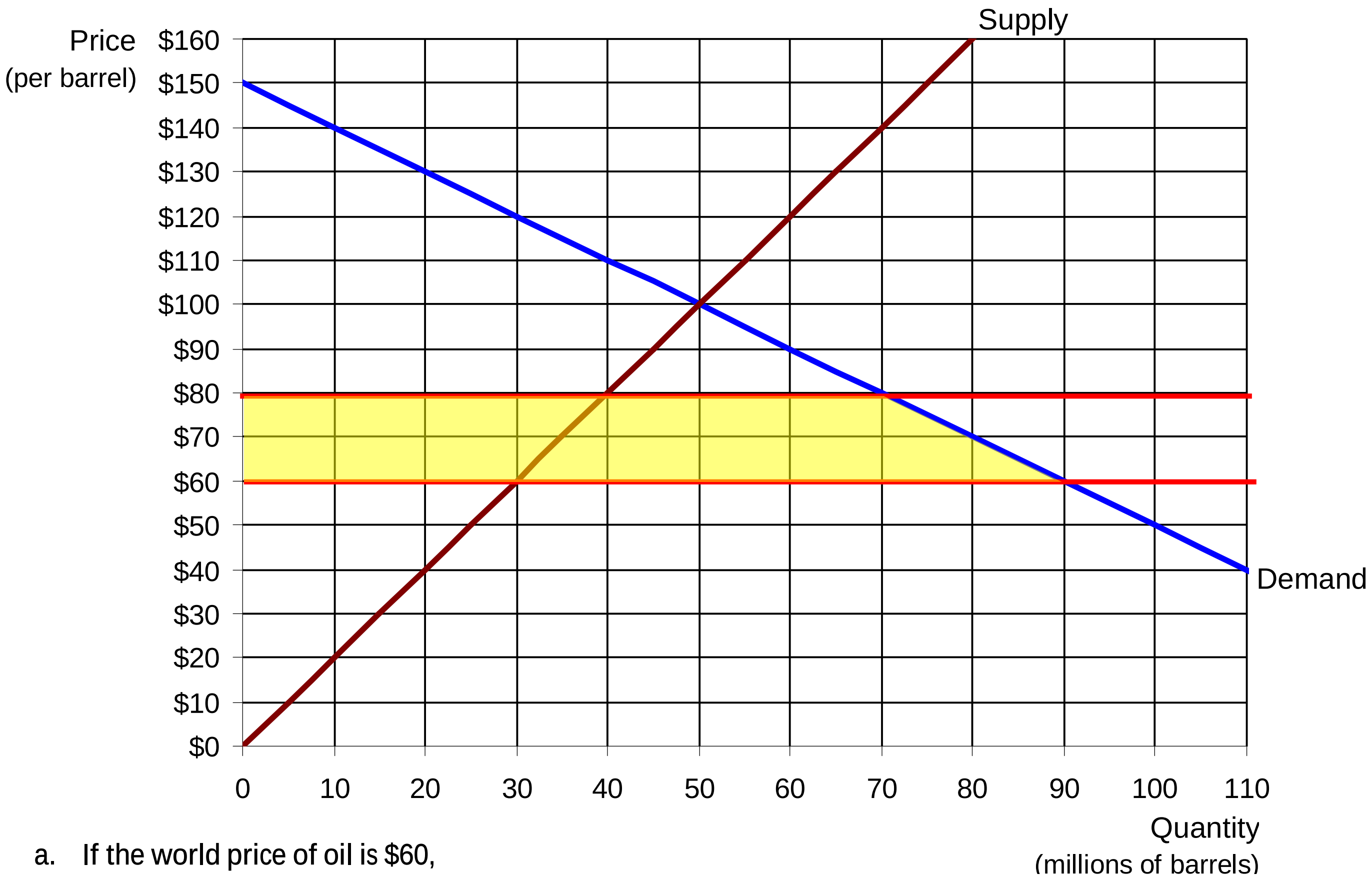
total surplus = A + B + C + D (this includes the tax revenue, B + C)

The dead-weight loss of the tax = G + H



3. The gains from trade in oil.

For the questions on this page, refer to the following graph of the oil market. The supply curve shows the quantity supplied by U.S. oil producers at different possible prices. The demand curve shows the quantity demanded by U.S. oil consumers at different possible prices. Assume international trade is "free" (meaning unrestricted).



a. If the world price of oil is $60,
quantity supplied by U.S. producers = 30 million barrels
quantity demanded by U.S. consumers = 90 million barrels
quantity imported = 60 million barrels

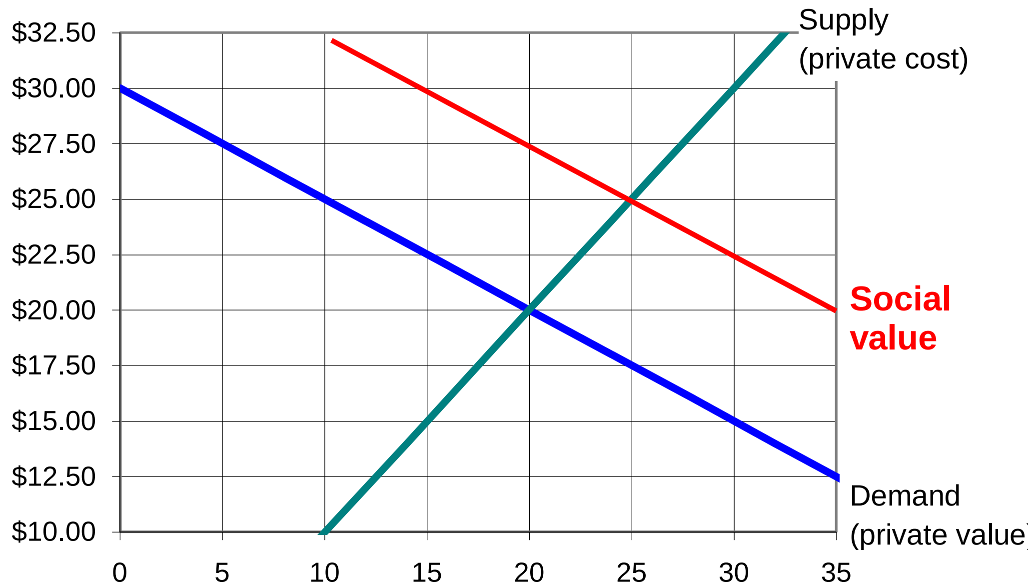
b. Due to wars in the Middle East, the world price of oil rises from $60 to $80. As a result, consumer surplus changes. Drawing directly on the graph above, show me the area that represents the change in consumer surplus, labeling it "ΔCS", and calculate the size of this area here:

the change in consumer surplus equals: –$1600 (the negative sign is because CS falls, not rises)
Two ways to find the answer.
method 1: new CS – old CS = [½ x 70 x $70] – [½ x 90 x $90] = 2450 – 4050 = –$1600
method 2: ΔCS = –{[$20 x 70] + [½ x 20 x $20]} = –{$1400 + $200} = –$1600

c. Continue to assume that the world price of oil has risen from $60 to $80. Does producer surplus change? If so, determine how much it changes, and write your answer here:
the change in producer surplus equals: $700
method 1: new PS – old PS = [½ x 40 x $80] – [½ x 30 x $60] = $1600 – 900 = $700
method 2: ΔPS = [$20 x 30] + [½ x 10 x $20] = $600 + $100 = $700

4. Externalities

The graph shows the market for fire extinguishers. Use it to answer the questions on this page.



a. The market equilibrium quantity of fire extinguishers equals: 20

When someone buys a fire extinguisher, they protect not only their home from fires, but also any nearby or adjoining homes (e.g. condos and townhouses). Yet, the buyer receives no compensation for the protection he unintentionally provides his neighbor. Suppose the external benefit of each fire extinguisher is $7.50.

b. At the market equilibrium quantity, which is higher, the social value of the marginal fire extinguisher, or the cost of producing the marginal fire extinguisher (or are they the same)? Could total surplus be higher at a higher or lower quantity, or is total surplus maximized at the market equilibrium quantity?

At Q = 20, the social value of the marginal (20^{th}) fire extinguisher is $27.50, the sum of the private value ($20.00) and the external benefit ($7.50). The cost of the 20^{th} fire extinguisher equals $20. Total surplus would be higher at a quantity higher than 20, because the value to society of additional fire extinguishers is greater than the cost of producing them.

c. Draw the social value curve directly on the graph above.

The social value curve appears on the graph in red. At every value of Q, the social value is $7.50 higher than the private value.

d. The socially optimal quantity (which maximizes total surplus) equals: 25

e. What policy would "internalize" this externality and achieve the social optimum? (In plain English, what should the government do in order to help the economy get to the best possible outcome?)

Giving buyers a subsidy of $7.50 per fire extinguisher would "internalize the externality" – i.e., it would make buyers act as if they care about the external benefit to their neighbors. It would shift the demand curve up by $7.50, which would then coincide with the social value curve. Then, the market outcome would be the socially optimal outcome.