

Guide to the Answers to Midterm 1, Fall 2010 (Form A)

(This was put together quickly and may have typos. You should really think of it as an unofficial guide that might be of some use.)

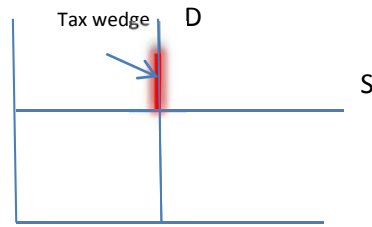
1. First, it's important to know what market we are looking at. The question states that it's the market for sugar. So for #1, if scientists invent a new cost effective way to make ethanol out of sugar, then it means that the demand of sugar will go up (since you can now use sugar to make ethanol). Thus, if you draw the supply and demand diagram, this causes price and quantity to both go up. So the answer is A.
2. Right off the bat, you see that lowering cost of production process will shift the supply curve. More specifically, it shifts it to the right, which makes sense because the price drops. We also observe that the quantity moves up when there is a rightward shift of the supply curve. So the answer is C.
3. We are given that sugar and corn syrup are both used as sweeteners. This means that they are substitutes. Then if the price of a substitute falls, then we see that people will start buying corn syrup instead, so the demand for sugar will decrease. This causes a leftward shift of the demand, and thus quantity and price both goes down. The answer is D.
4. If sugar is a necessity good, it means that it is also a normal good. A necessity good just means that the rise in the demand of that good is less than the increase in income. Keep in mind that this means the change is positive but not just as great. For example, if income goes up by 10%, a necessity good will be one that goes up by 2% or 5% (anything more than 0% and less than 10%). Thus, if income decreases, this means that being a normal good, the demand will fall. Thus, the answer is D.
5. We've already seen what happened in #2 and #3. This question is just putting the two together. If #2, we see that Q goes up and P goes down. In #3 we see that Q goes down and P goes down. Thus, we see that P goes down no matter what, but the change in Q is not clear since one causes it to go up and one causes it to go down. Thus, the answer is D.
6. First, rank the buyers from order of highest to lowest (we want to put the one willing to pay the most first) and the sellers from lowest to highest (we want to put the one willing to sell for the

lowest first). Then, we can see clearly that at \$7, we have the price that clears the market since the buyer wants to buy at \$7 and the seller wants to sell at \$7. The answer is C.

7. Just counting down, we see that Brian, Dale, and Chuck will buy and Beth, Dolly, and Alice will sell. Thus, since each person is buying or selling only one thing, the quantity that clears the market is 3. The answer is D.
8. So we are given that price of widgets go up and quantity of widgets remain unchanged. First of all, we see that this is the case when the supply curve is completely vertical, which means it's completely inelastic. Right away, since part of the question asks you what the elasticity of the supply curve is, you should try to draw it completely vertical or completely horizontal (we see that there's an option for unit elastic as well, but we know that if it was unit elastic then quantity will have to change). But if the supply curve was horizontal, then we see that quantity does move with a shift in the demand curve but price stays the same. This is not what we want. So we see that if the supply curve is completely inelastic, then a shift in the demand curve can cause the result we are looking for. But which way does the demand curve shift? Well, since price goes up, we see that it shifts to the right. This means that the invention of smidgets increased demand for widgets, which means they must be complementary goods. So the answer is B.
9. By the First Welfare Theorem, we see that only 2 and 3 have to hold. The theorem and Pareto Optimal allocations say nothing about whether or not the good is normal, and a Pareto Optimal allocation also does not mean everyone gets the same amount. Remember that in a market where there are ten pies, giving 10 to person A and none to person B is a Pareto Optimal allocation, since you can't make someone better off without making someone worse off. The answer then is B.
10. It must be true that the lowest cost producers produce. The other answers don't make any sense or don't have anything to do with an efficient allocation. The answer is D.
11. In a binding price floor, we see that producer surplus cannot be determined right away because it depends on the elasticity of the curves. (i.e. We are trying to compare the area that the producers lose from inefficiencies of the market to the rectangular area that they gain from the price floor). We also see that there is no way consumer surplus can increase with a price floor. Thus, the answer is A.
12. First notice right away that the allocation is not efficient because it's not at equilibrium. Thus, we can guess that it's not Pareto efficient because of something to do with D4, D5, or S4, S5 – since there are actually allocations where everyone will gain if they were selling. We see that D makes this connection between S4 and D4, and if S4 sold his widget to D4 for \$4.50, both S4 and D4 will be better off and as a result it's an example to why the allocation where S1, S2, S3 produces and D1, D2, D3 each consume a widget is not a Pareto efficient allocation. The answer is D.
13. If there was a price ceiling at \$4, this means that now anyone who wanted to buy at \$4 can buy. This includes D1, D2, D3, D4, D5, and D6. Thus we know (1) is not true, and that (2) is true – since in the price ceiling, there will only be 4 units for sale on market and there are 6 people who would want to buy. (i.e. It could be D1, D2, D3, D4 buying or D1, D3, D4, D5 buying... who knows?) What we do know is that S1, S2, S3, and S4 will produce because they are the only ones

willing to produce at a price of \$4. The other suppliers will rather not make anything and take \$0 profit than to have negative profits. If we know who's going to produce, (4) is obviously false. Thus, the answer is C.

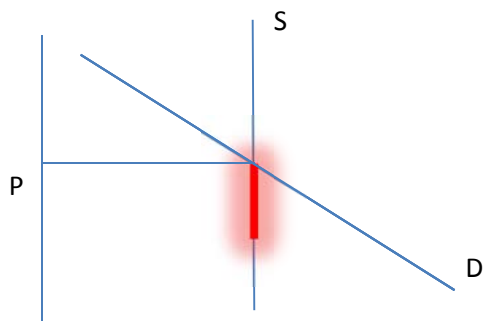
14. By intuition, if the demand curve is completely inelastic, then it makes sense that no matter the price, the demand will still be unchanged. Thus, if you throw in a tax, the buyers will bear the entire burden of the tax and quantity will remain unchanged. You can also show this by using the wedge method, with the supply curve being completely horizontal and the demand curve being completely vertical. For a "tax wedge", we want to draw a line from below the demand curve to the supply curve. This is only possible if we draw this wedge along the demand curve.



Thus, we see that the answer, with either the intuition or the graphical wedge method, is B.

15. Fill out the table. Once you do, you will get the answer to the next few questions. The first thing you should do is seeing the \$6 tax, you should use the wedge method to draw a wedge connecting the supply and demand curve left of the equilibrium with a length of 6. We see that this can be done at the quantity of 2, where the price of demanders is \$8 and the price of suppliers is \$2. Now we have all the information we need to fill out the chart. Quantity, as we already see, is 2. Price of demanders and price of suppliers are \$8 and \$2, respectively. To calculate CS, we want to find the area of the region above the price of demanders and below the demand curve. This area happens to be a triangle. Since the area of a triangle is $\frac{1}{2}(bh)$, we see that the base is 2 and the height is 2, so the area is half of 4, which is 2. For PS, we want the area underneath the price of the supplier and above the supply curve, in this case it's a triangle and by the same method as the CS, we see that the PS is also 2. Government surplus is just taking the quantity being produced in the market (which is 2) and then multiplying it by the tax (\$6), so the GS is \$12. We see that this is positive because it's a tax (remember that a subsidy will mean a negative government surplus). Finally, adding all of this up, you get 16 as the total surplus. Subtracting the free market numbers from the tax numbers, we get -3, 3, -3, -10.5, -10.5, 12, and -9 for Q, P^D , P^S , CS, PS, GS, and TS, respectively. Thus, the answer to 15 is E.
16. From the calculations in 15, the answer is D.
17. From the calculations in 15, the answer is B.
18. From the calculations in 15, the answer is B.
19. From the calculations in 15, the answer is C.
20. Now we have a quota, and only 2 units will be sold in the market. So using the wedge method for the quota, we see that the wedge will be exactly where the tax wedge was. This wedge is the equilibrium price of the quota. Since the wedge goes from \$2 to \$8, we see that the equilibrium price is \$6 (\$8-\$2). The answer then is D.

21. We see that the producer surplus, now that they own the quota, is basically the same as looking at the producer surplus plus the government revenue in the tax example. The areas are the same, and we have already calculated these areas. So instead of doing it again, but with different names (in the quota example it would have been producer surplus (without the quota) plus the market value of the quota), we should just use the numbers we found and see that this is basically the PS (2) plus the GS (12) which is 14. So the answer is D.
22. If it's illegal to buy and sell quotas, then there is no guarantee that the lowest cost producers have the quotas to produce. In doing our wedge example, it's the assumption that the lowest cost producers will produce because even with a quota, the higher cost producers will sell their quotas to the lower cost producers, who can actually produce at a profit (whereas the higher cost producers, even with a quota, may not turn out a profit so they rather sell their quota and make money instead of sell widgets and lose money). Since this is the case, chances are that the total surplus will be lower than the original quota system (unless the quotas were somehow distributed to the lowest cost producers in the first place; but this isn't exactly the right answer because this is one case compared to the obvious every other cases where total surplus does change). The answer then is B.
23. With elasticity, remember that it's **percentage** change in quantity divided by **percentage** change in price! Thus, using the midpoint method, we have $(2/10)/(-2/4)$ (note, we get the numerator $2/10$ from the change in quantity $(11-9=2)$ divided by the midpoint of the quantities $((.5)(11+9)=10)$ and with prices, we have $(\$3-\$5=-\$2)$ and $((1/2)(\$3+\$5)=\$4)$. Since in this class we just take the positive value of elasticity, we can ignore the negative sign. We then have $(2/10)/(2/4)$ which means you can flip the $(2/4)$ and make it $(2/10)$ times $(4/2)$, which is $(8/20)$ and thus less than 1. We see that if the elasticity is less than 1, it's inelastic. Note that we are only given information on price and quantity, so it says nothing about income. D and E thus are not good choices for an answer! Thus, the answer is B.
24. This is a tough question. It doesn't seem obvious right away what the right answer may be. You'll need to look at each answer to see if it's right or wrong. What we do know is that the price of gas increases as taxes increases (as given by the graph). So, let's look at each of the answers. For A, it says that the demand must be unit elastic. Is this the case? Let's draw it and find out.

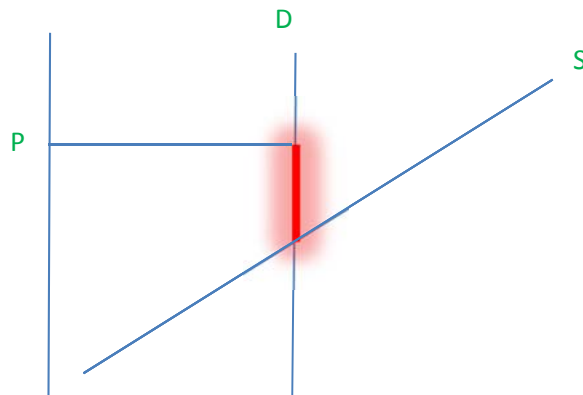


I drew the supply curve as perfectly inelastic because in the case where supply is normal, it does indeed tell us that with a tax, price will increase, but that's expected. However, the question is does the demand curve being unit elastic **always** say that the price will increase with a tax? So we look at the more interesting case where the supply curve is perfectly inelastic. What

we need to do is either see that it must be true that based on the information we are given, that this answer (demand being unit elastic) is true OR find a counterexample as to why the choice is wrong. We see then that with the supply curve being perfectly inelastic, what happens when you draw the tax wedge, which I shaded in (remember it needs to go from the demand down to the supply, and not from the supply down to the demand, in the case of a tax), is that prices will remain unchanged at P with the tax (since suppliers bear the full burden of the tax). This is not in agreement with the information that we are given (that as taxes go up, price goes up). In summary, what we did here was add a tax to a unit elastic curve and inelastic supply curve and saw that prices do not change. We would expect that the correct answer would give us something where if we add a tax, the price will go up **in every case** of elasticity. Thus, we've eliminated A and C as answers. Note that C was eliminated because if we draw an inelastic supply curve, we can just use a unit elastic demand curve to show a counterexample. (This is essentially what we showed for why A is not the answer) B is not an answer because we know nothing about income (we are only given information on prices). So the answer is either D or E. However, as we saw from our example, if the suppliers bear the primary burden of the gas tax, which is the same example as we have shown in the graph, that the price will also not go up if there was a tax. The key here is to see that suppliers paying the full burden means the supply curve is perfectly inelastic. The correct answer to this question is E, but let's go one step further and see what a correct answer could have been like.

EXTRA (NOT NEEDED FOR THIS QUESTION BUT GOOD TO THINK ABOUT)

Consider a perfectly inelastic demand curve and a normal supply curve.



In this scenario, we see that this fits with the information we are given. Since the demander bears all the burden of the tax, we see the price actually increases from the equilibrium to P if there was a tax. Thus, this goes along with the information that we've been given, that as taxes on gas increase, the price increase. Regardless of the elasticity of the supply curve (completely elastic or unit elastic), this is true.

25. This was from your reading. You saw the Professor Holmes compared Norway and US since they have similar income. Thus, the answer is E.

26. Notice that an elasticity of .1 means the demand is inelastic. Then notice that 1.0 means it's unit elastic. We know that in the short run, things can't be changed as quickly so you could expect a inelastic demand curve. Thus, the answer is either short-run, medium-run or short-run, long run (or perhaps an argument can be made that it's medium run, long run). But we see that it must go from something in the shorter term to something in the longer term, since the elasticity goes up, meaning that people are adjusting. The only answer given that is one of those two is A.
27. Observe that with a price ceiling at K, the quantity supplied is S and the quantity demanded is U. Thus, we can see that there is a shortage (since demand is greater than supply) and the exact length of the line is LN (look at the graph). The answer then is A.
28. CS with efficient rationing (the case that we always look at, consumers who value the product the most consume and producers who have the lowest cost produce) is then just the area ACLK. Why is it not ANK, you may ask? Because producers are only producing at point S. The consumers can't get surplus (from area CLN) if the producers aren't producing past S. Thus, the answer is E.
29. With uniform rationing, which means that all consumers that wish to purchase a good are equally likely to get it in the case of a shortage, we see that A cannot be true since KLR is just the producer's surplus. There must be some sort of consumer surplus even with uniform rationing with a downward sloping demand curve. C is false because that's the total surplus if there was efficient rationing, and we would expect that with uniform rationing, since it's not true that consumers with the highest willingness to pay will consume (this also makes D false), that the total surplus in uniform rationing will be lower than that of the total surplus from efficient rationing. Thus, this leaves B or E. We see that B is true because with a ceiling, we see that there will be a deadweight loss even with efficient rationing. But we have already said that the total surplus should go down because the "right" people are not consuming, thus total surplus must decrease by even more than the area CHL, which is the deadweight loss in efficient rationing. To summarize, we know that total surplus must fall when there is uniform rationing (compared to efficient rationing), and the only statement that is true is B, which states that compared to the free market, the total surplus from uniform rationing must be even smaller than the total surplus in efficient rationing. Thus, the answer is B.
30. This is from your reading: the answer is B.
31. If you draw a supply and demand diagram with a perfectly inelastic (vertical) supply curve and regular demand curve, you will see that using the wedge method, there is no deadweight loss. (draw a wedge connecting the demand and supply. There is no DWL triangle that will show from the diagram. Thus, the answer is A.
32. Now draw a supply curve that is completely horizontal, with a regular demand curve. Now draw a wedge from the demand curve to the supply curve (remember you do this on the right side of the equilibrium, when you can). You will see that there is a deadweight loss area when you do this.
33. The definition of a luxury good is that as income goes up, the quantity demanded will go up by even more. Thus, A is false since income elasticity must be more than 1 (and is positive), B is false (since it needs to be positive), and C is true because spending on the good as a share of income increases with income. (think about it in terms of extreme examples. If your income

went from \$100 to \$1000, then the definition of a luxury good means you want more. What is you went from 10 unit demanded at \$100 to 100 units demanded at \$110? Thus by a 10% increase in income, there was a 1000% increase in quantity demanded. This is then an example of a luxury good. Now looking at the share of spending on the good as a share of income, it's obvious that if you are demanding more, you will be spending more. So the share (you can think of it as fraction of income devoted to spending on the luxury good) will increase with income.) Thus, the answer is C.