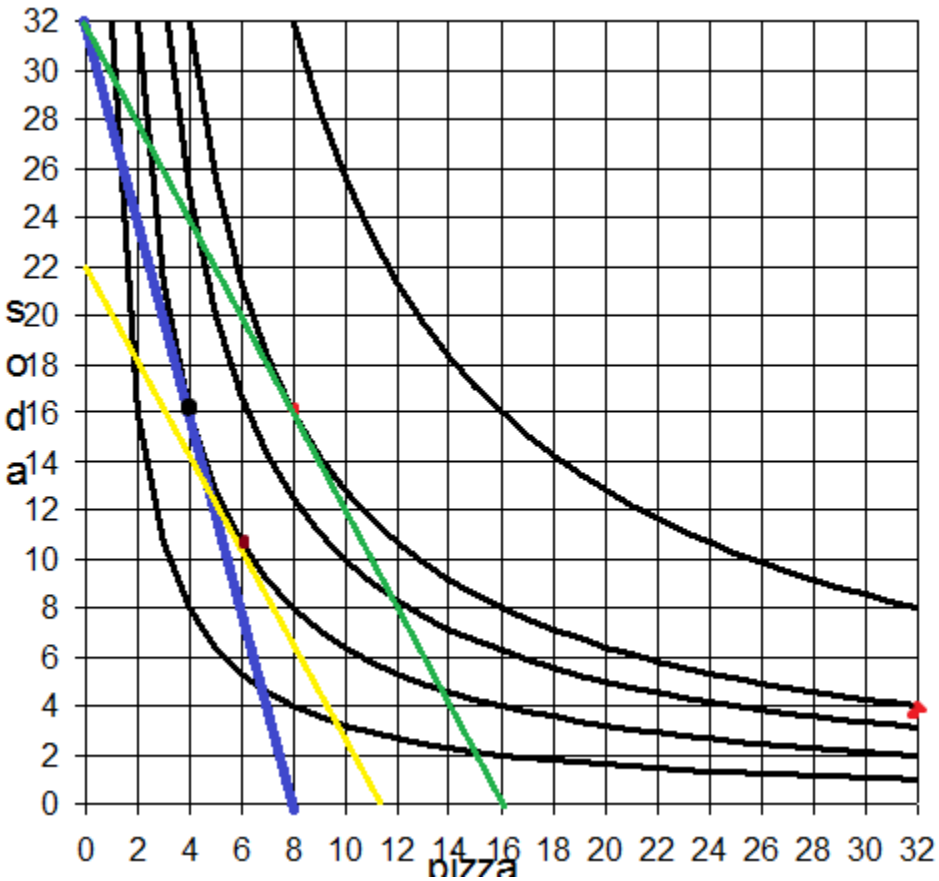
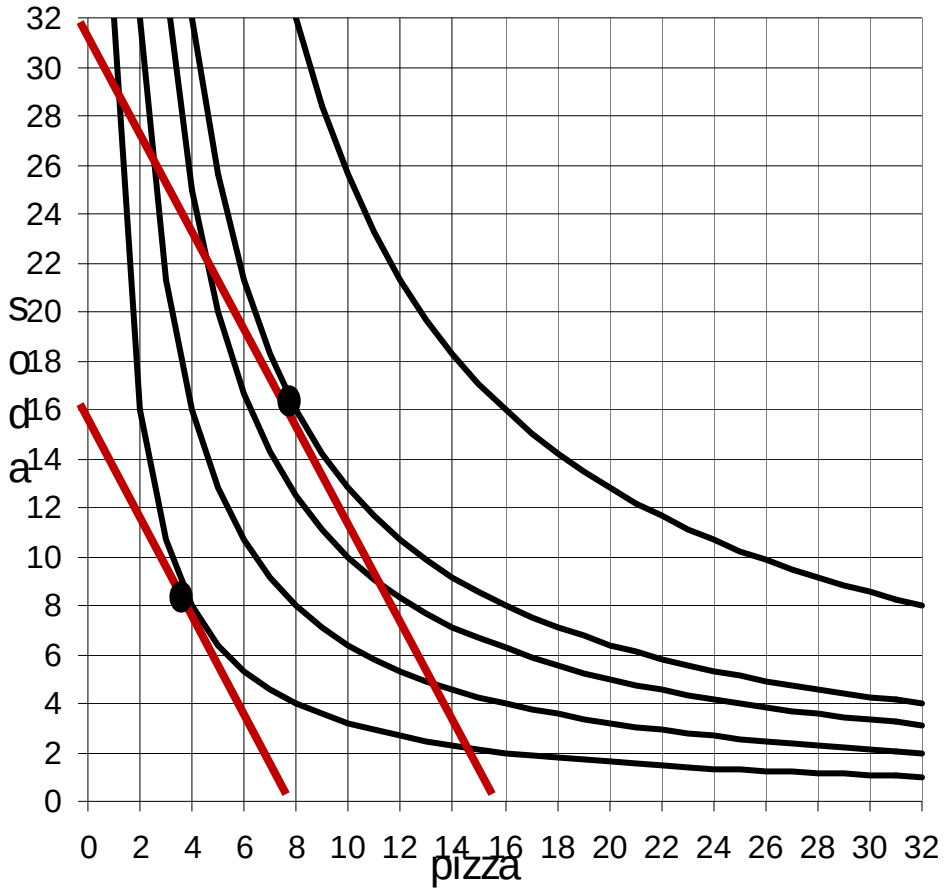
This is the solution guide compiled by your instructors of Econ 1101. This is a guide for exam 2 form A. If you had form B, you can still figure from this guide what the answers to your questions are. If you have any questions, please contact your TAs or instructors.

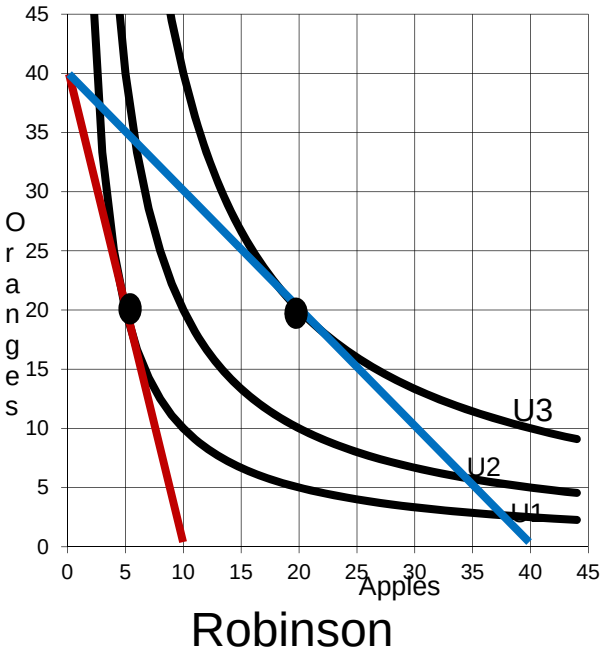
1. This is form A, so the answer is A.



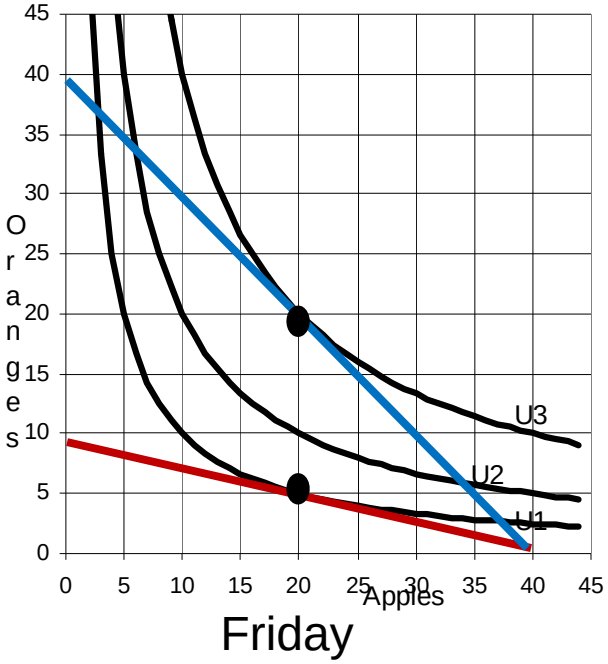
2. From Buckeye's indifference curves, (8 pizzas, 16 sodas) is on the second highest indifference curve (IC) from the above graph and the only bundle from choices on the same indifference curve is (32 pizzas, 4 sodas), which I also show in red point in the graph. The answer is D.
3. I show the budget constraint (BC) in blue line, and the opportunity cost of one more pizza is just the slope of BC, 32/8=4 sodas. The answer is E.
4. The tangent point on both BC and IC, where marginal rate of substitution equals price ratio is just the optimal consumption bundle, shown as black point on the graph, (4 pizza, 16 sodas).
5. The new BC is shown in green, and the new optimal consumption bundle is (8 pizza, 16 sodas), so consumption of pizza increased by 4 units. The answer is B.
6. To identify the income effect, we draw a yellow line parallel to the new budget constraint, and tangent to the original indifference curve, and the tangent point is (6 pizza, 11 sodas), so the income effect on demand of pizza is the increment on pizza from this point to the new optimal consumption bundle, 8-6=2 pizzas. The answer is C.



7. As income decreases, the budget constraint shifts inward in a parallel fashion (because neither the price of pizza nor the price of soda changed). The new budget constraint now intersects the pizza-axis at Q=8 (because income/price = $8/$1=8) and the soda-axis at Q=16 (because income/price = $8/$0.5 = 16). Buckeye's new optimal consumption bundle is (pizza=4, soda=8). Now consider the three statements:
   (a) TRUE. When Buckeye's income was $16, he used to spend 50% of his income on pizza ($1*8=$8). Now Buckeye's income is $8, he is still spending 50% of his income on pizza ($1*4=$4).
   (b) FALSE. Consumption of both pizza and soda decreases as income decreases. This meets the definition of a normal good. If either item were an inferior good instead (e.g. ramen, spam), its consumption would increase instead of decrease, when income decreases.
   (c) FALSE. Income elasticity = (Δ%Q)/ (Δ%Income). Since both the numerator and the denominator are negative in this case, the overall fraction is positive. Income elasticity is positive.
   Thus the correct answer is A.



Robinson

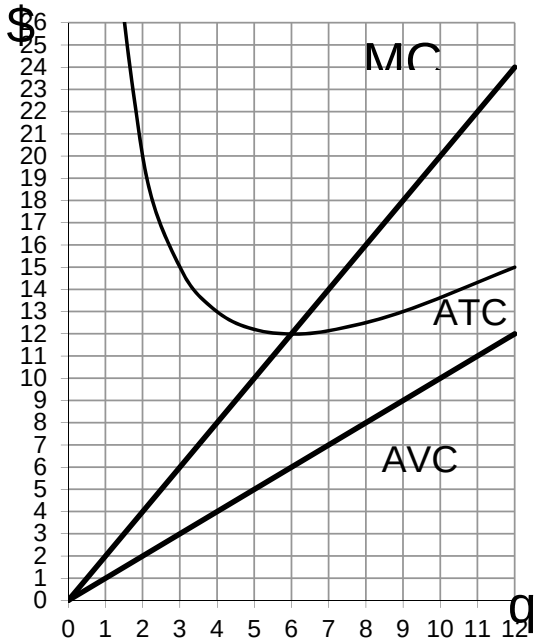


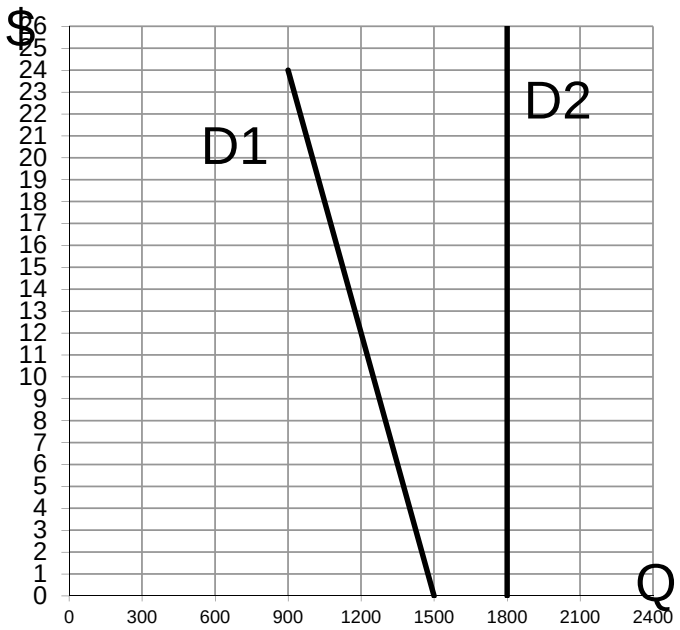
Friday

8. A person has an **absolute** advantage in producing apples if he requires the least amount of resources per unit produced. Robinson requires 1 hr/apple while Friday requires 0.125hr/apple (= 8 apples/hr). Thus Friday has an absolute advantage in producing apples.
   A person has a **comparative** advantage in producing apples if he requires the least opportunity cost (expressed in terms of number of oranges forgone) per apple. Opportunity cost of producing an apple is given by the slope of the person's budget constraint. Robinson's budget constraint has slope = 4, i.e. he has to sacrifice 4 oranges per apple produced, i.e. his opportunity cost of producing each apple is 4 oranges. Friday's budget constraint has slope = 0.25, i.e. he has to sacrifice 0.25 oranges per apple produced, i.e. his opportunity cost of producing each apple is 0.25 oranges. Friday has a comparative advantage in producing apples. Thus the answer is A.
9. Optimal consumption bundles are defined as the point where the highest indifference curve is tangent to the budget constraint. They are illustrated in the above diagrams. Robinson's optimal consumption bundle is (5 apples, 20 oranges). The answer is E.
10. When trade is possible, each person will specialize in the good in which he has comparative advantage in. Robinson has comparative advantage in oranges, while Friday has comparative advantage in apples. Thus Robinson produces (0 apples, 40 oranges), while Friday produces (40 apples, 0 oranges). Their common budget constraint under trade is (40 apples, 40 oranges), which is illustrated above in blue. Both will consume the bundle (20 apples, 20 oranges), which is the point where the highest indifference curve is tangent to the new budget constraint under trade. The answer is C.

11. Let's consider each statement individually:
    (i) FALSE. MC is **not** required to be less than ATC at all quantities. At any quantity where MC<ATC, quantity produced for each firm will simply be zero in the firm's LR supply curve. In an industry LR equilibrium, each firm can choose to produce at its profit-maximizing quantity, which is where ATC is at minimum. This is also where ATC intersects MC.
    (ii) FALSE. The shape of the demand curve has no effect on the shape of the supply curve.
    (iii) TRUE. This is to ensure that all firms have the same cost curves. (I.e., a firm is more costly when it has worse technology.) This is necessary because all firms will then have the same profit-maximizing price (the minimum ATC), which gives the price of the LR supply curve.
    (iv) TRUE. There cannot be barriers to entry because in the LR, the industry's supply adjusts to changing demand by changing the number of firms, **not** changing the amount of production within each firm.
    (v) TRUE. This is similar to (iii). This ensures that cost curves of firms do not change as the number of firms in the industry increases.
    Thus the answer is C.

The following chart is for questions 12-18.

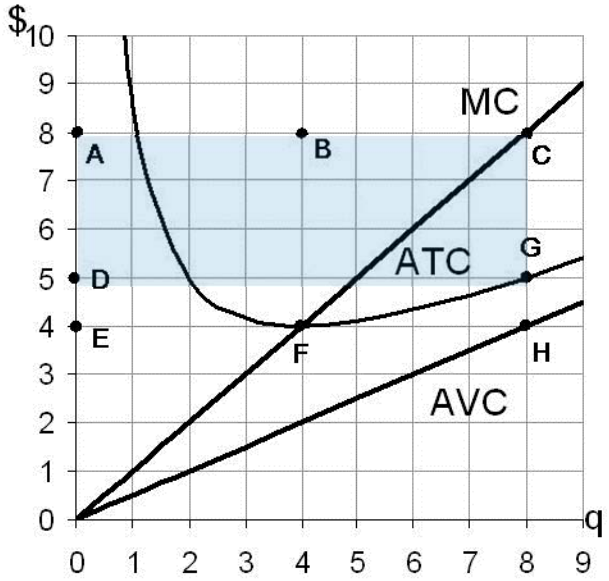




12. Fixed cost equals **36.** The correct answer is e. To find the fixed cost note that AFC=ATC-AVC and FC=Q*AFC. For example, at a quantity of 6 ATC is 12 and AVC is 6, so AFC is 6. This means that fixed cost is Q*AFC=6*6 or 36. A similar calculation could be performed at other quantities (where it is easy to see the value of AVC and ATC) to get the same answer. The answer is E.
13. If the price equals 4, in the short run the firm will produce. The resulting maximum profit equals -32. A profit maximizing competitive firm sets price equal to marginal cost to determine the quantity

to produce. In this case when P=4, MC=P when Q=2. At Q=2 MC is larger than AVC so the firm will produce in the short run. The firm's profit is (P-ATC) *Q=(4-20)*2, so profit is -32. The answer is E.

14. The price P^{LR} is 12. Long run price is the minimum of the ATC, which is 12. The answer is E.
15. In the Long-run, output per firm q^{LR} equals 6. In the long run firms produce at the minimum of ATC. ATC is at its minimum when q=6. The answer is C.
16. Long-run industry quantity Q^{LR} equals 1200. The long run industry supply is perfectly elastic and equals the long run price, which is 12. At a price of 12, the industry quantity demanded is 1200. The answer is B.
17. Long-run number of firms N^{LR} equals 200. $N^{LR} = Q^{LR} / q^{LR}$ =1200/6 = 200. The answer is C.
18. Suppose the industry is initially in long-run equilibrium at demand D1 and the number of firms equals the number in the previous question. Demand then shifts to D2. In the **short-run**, the equilibrium price will be 18. To answer this question, you need to find the short run industry supply curve. Short run industry supply is equal to firm supply multiplied by the number of firms. We know that at p=0 each firm produces zero, so short run industry supply is also 0 when p=0, from the previous questions we know that short run industry supply equals 1200 when price is 12 and number of firms is 200. Short run industry supply is linear since MC (short run firm supply) is linear. We can then connect the two points (P=0 Q=0) and (P=12, Q=1200) to get short run industry supply. This line intersects D2 at P=18 Q=1800. The answer is E.
19.

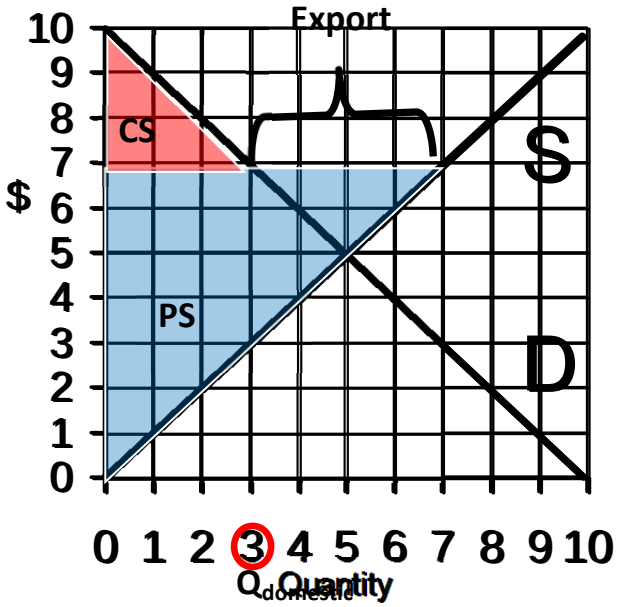


Recall Profit = TR-TC

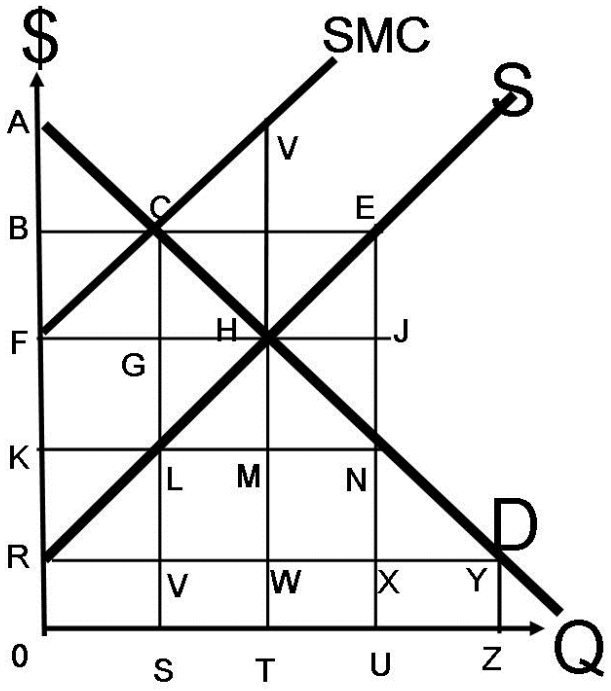
= [P-ATC]*Q

So in order to find out profit we need price P, quantity Q and ATC at Q. Price is given as $8. Quantity is determined by the intersection of MC and MR. In case of perfect competition MR=P i.e. we have P=MR=MC . The quantity at which this equation holds true is 8. At Q=8 the distance between price and ATC (P-ATC) is the line CG and Q=8=DG. So profit is CG*DG=ACGD. The answer is D.

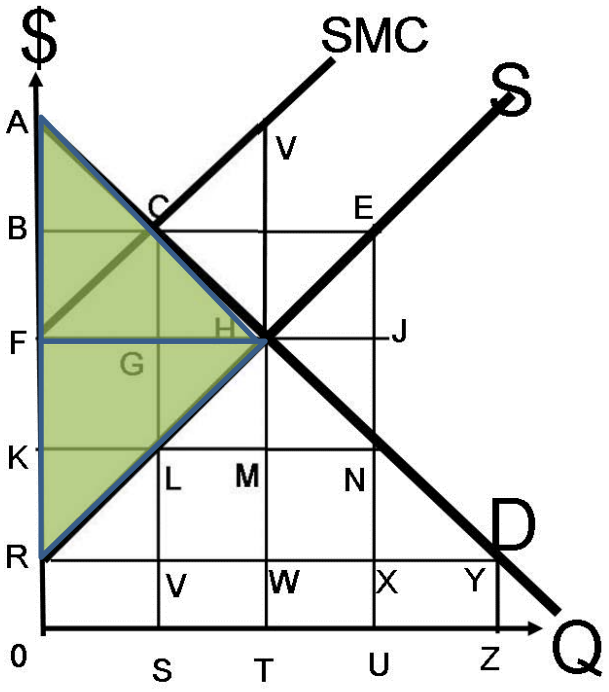
20. Straight from the definition! The answer is A.
21. A tornado siren is non-excludable as no one can be excluded from hearing the siren and it is non-rivalrous as my hearing the siren does not affect your hearing at all. The answer is C.
22. In order to export there has to be an excess supply i.e. the price has to be above the equilibrium price. So producers are better off as they are making more profits now and consumers are worse off as their surpluses go down. Refer to the following graph:



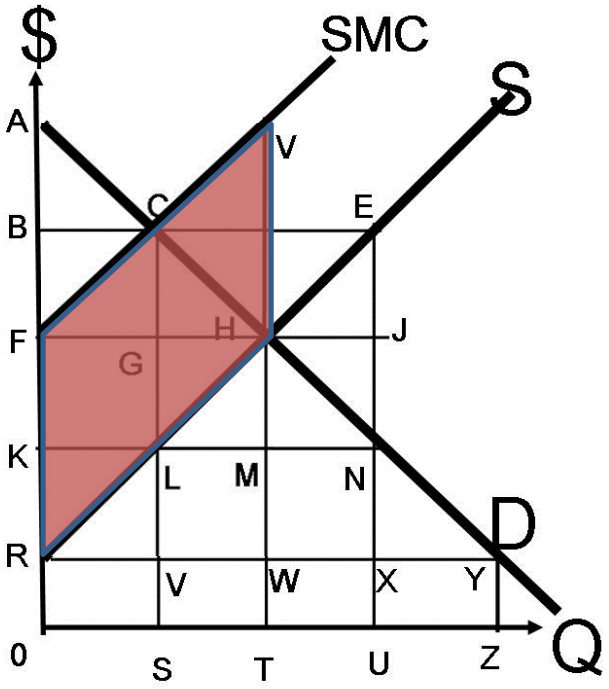
The answer is D.



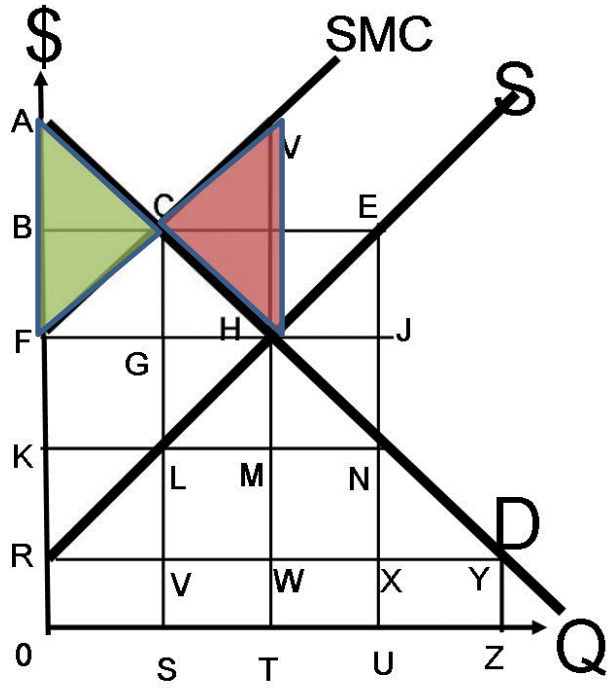
23. Market equilibrium quantity is determined by the intersection of PMB (Demand) and PMC (supply) curves which is T and socially efficient quantity (in case of a negative externality) is determined by the intersection of PMB and SMC which is S. The answer is C.
24. We are looking for a wedge between supply and demand such that the price that demand people pay is equal to the social marginal cost (which takes into effect the negative externality). The wedge that accomplishes this goal is at CL. The answer is E.
25. The consumer and producer surpluses before the tax looks like this:



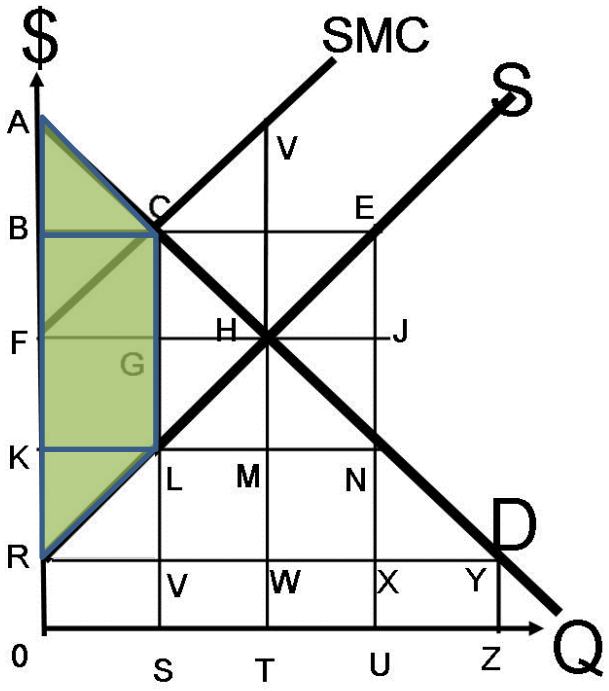
The negative surplus caused by the externality looks like this:



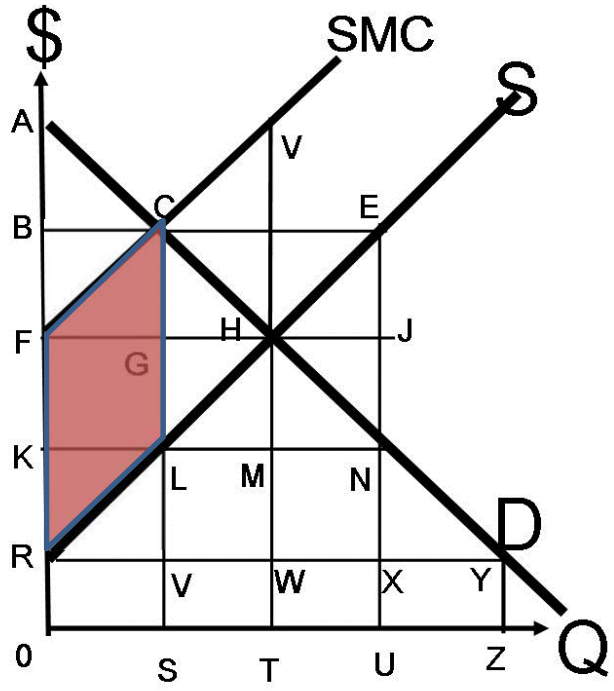
Therefore, after cancelling out the overlapping area, the **total surplus before the tax looks like:**



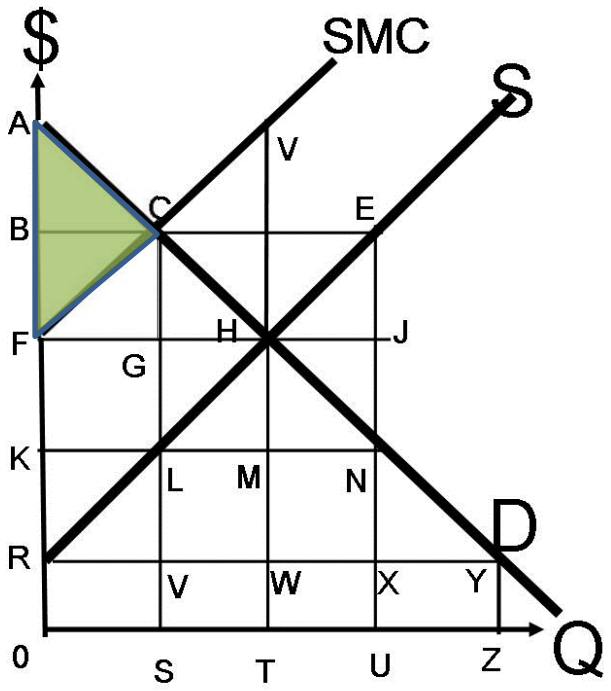
After the tax, the consumer, producer, and tax revenue looks like this:



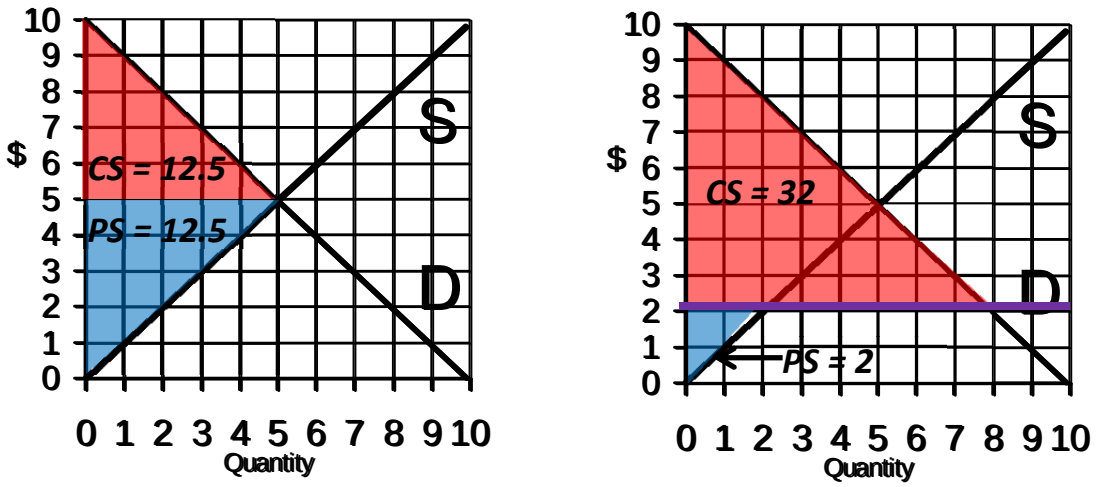
And the negative surplus coming from the externality is:



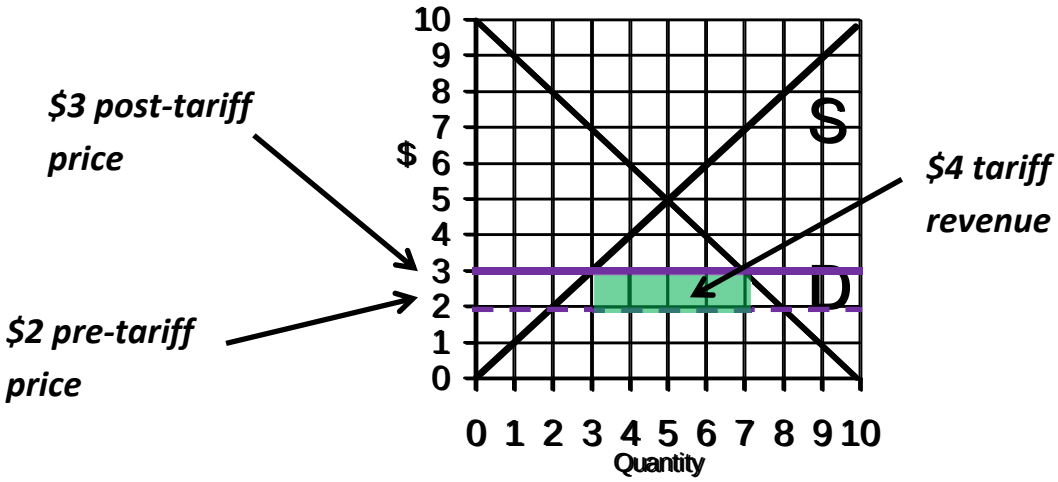
The total surplus, therefore, is shown below. Comparing this to the diagram without the tax, the difference is the red triangle. Thus, the correct answer is C.



26. (i) is false. Cap and trade caps the total amount of carbon emissions and allows individual plants to trade their allowances amongst each other
    (ii) is true – Cap and trade is similar to a quota system, which differs from taxes only in "who gets the green box." In the case of cap and trade, the "green box" goes to the owners of the allowances
    (iii) is true – As discussed in reading and in class, the EU has adapted this policy
    (iv) is false – Congress has not yet passed a cap and trade system.
    The answer is C.
27. Comparative advantage means each country engaging in trade is specializing in the task that has the lowest opportunity cost. Both of these statements are examples of countries specializing in tasks for which they have low opportunity costs. The answer is C.



28. Before opening up to trade, the equilibrium price and quantity are $5 and 5 widgets respectively. Consumer and producer surplus are each 12.5, so total surplus before opening to trade is 25. This is shown in the graph on the left above. Once Econland opens to trade given the world price of $2, Econland's supply drops to 2 widgets while demand increases to 8 widgets. Consumer surplus rises to 32 while producer surplus falls to 2. This is illustrated in the graph on the right. Total surplus after opening to trade is therefore 34, so the change in total surplus is 9. The answer is E.
29. From the solution to question 28, we know that producer surplus before opening to trade is 12.5 and that producer surplus falls to 2 after opening to trade. So the change in producer surplus is -10.5. The answer is D.
30. Imposing a $1 tariff on imported widgets increases the price of widgets in Econland to $3. At this price, Econland's producers supply 3 widgets while Econland's consumers demand 7 widgets. This means that Econland must import 4 widgets. Since Econland's government collects $1 in tariff revenue for each widget imported, total tariff revenue is $4. The graph below illustrates this result. The answer is D.



31. In both the short and the long run, a perfectly competitive firm's profit-maximizing quantity sets price equal to *marginal cost*, not *average variable cost* or *average total cost*. Thus i) is false. In the long run, firms choose whether or not to pay the fixed cost and therefore may choose to exit the industry if they cannot earn non-negative profits. So ii) is true. In a perfectly competitive industry the price is equal to the minimum value the average total cost and all firms produce the corresponding quantity that minimizes average total cost. So all firms produce the same quantity and iii) is false. In the short run the number of firms is fixed and the industry supply surve slopes upwards as price and indivudual firm quantity may differ from their long run values if market conditions change. For example if demand shifts outward, the incumbent firms must increase their production so as to meet the additional demand. This will cause the market price to increase. If the price is greater than average total cost at the short-run quantity firms produce, firms will earn positive profits in the short run. Thus iv) is true. We have that i) and iii) are false while ii) and iv) are true so the answer is D.
32. We learned in class that there may be a reason why another country giving us goods for free may not be a good thing. Even though it will maximize consumer surplus, there may be some kind of externality associated with letting another country produce all the goods. Here, choice a (overall surplus in Econland is higher under free trade) and b (consumers will benefit from lower prices) are both good things, so they are not reasons why Econland would not want to allow trade. Choice d (Econland has a comparative advantage in computer chips) is a reason for trading. Thus, choice c (computer chips are an industry that promotes innovation in other domestic markets) is the correct answer, since if Econland lets foreign producers produce a lot of computer chips, other domestic markets may suffer because there is no longer the positive externality of having the computer chip industry at home. The answer is C.
33. This refers back to the lecture slides talking about the different mascots and their preferences for two different goods. Here, Keaton only cares about the amount of servings he has, where one serving is one egg and two slices of bacon. This means that he is equally as happy when he has one egg and two slices of bacon as he is when he has one egg and any number of bacon greater than two (like 10, 1000, etc). This is because with one egg, he can only have one serving (same with bacon, he is equally as happy between any number of eggs greater than one and 2 bacon, since that will only give him one serving). We call this kind of preference fixed proportion, or perfect complements. Ethan's preferences is for total gram of protein, so he can perfectly substitute between eggs and bacon since it doesn't matter if he eats bacon or eggs, as long as he gets protein. We call this type of preference perfect substitute. Thus, the answer is B.
34. Pharmaceuticals, Discount retailing, and software companies all have high fixed cost and low variable cost. For example, most of the money spent in pharmaceuticals is on research, for discount retailing most is spent on setting up a distribution center, and with software companies development is the biggest cost. Compare this fixed cost with the cost of making an extra pill, store, or CD (respectively). Because of this, the average total cost is decreasing the more you produce, and thus these firms exhibit increasing returns to scale. (Not to mention that these three were the examples given in lecture for firms that exhibit increasing returns to scale.) Thus, the answer is D.
35. With a positive externality in Econland, we know that total surplus can be improved if a subsidy equal to the amount of the external benefit is enacted (from our study of positive externality and

subsidies), so case (i) is true. Since it is a positive externality, we know that (ii) is not true because a tax will decrease the output in the market, which is the exact opposite of what we want (we want to tax when there is a negative externality). (iii) is true because SMC=PMC if there is no negative externality, as the private marginal cost is telling us the same as the social marginal cost when there is no negative externality. (iv) is true because what is socially optimal (where SMC=SMB) is above the free market equilibrium. Intuitively, this means that in the free market, there will be less than what society wants to be in the market. This makes sense because a positive externality means there is spillover benefit that is unintended, and because of this people want more of this spillover benefit, and thus in the free market, when positive externalities are not taken into account, the quantity produced will be lower than what is desired. The correct answer is C.