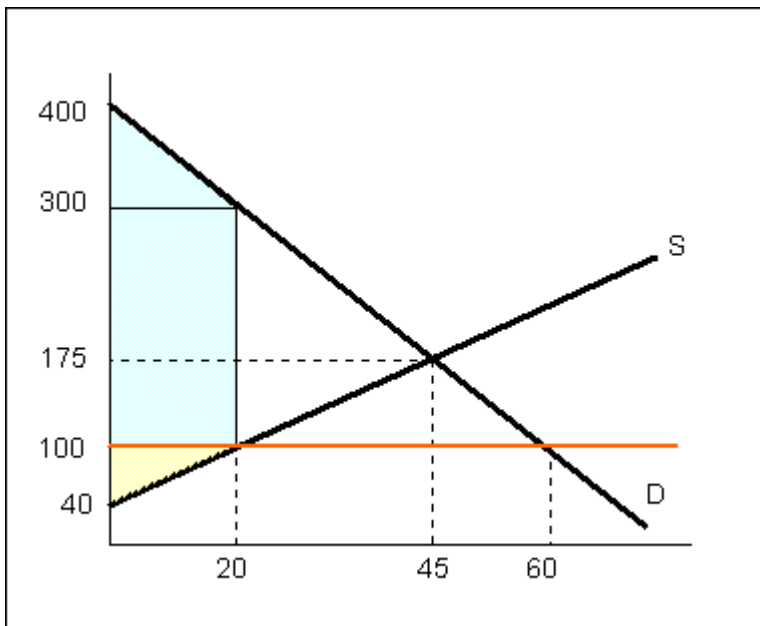
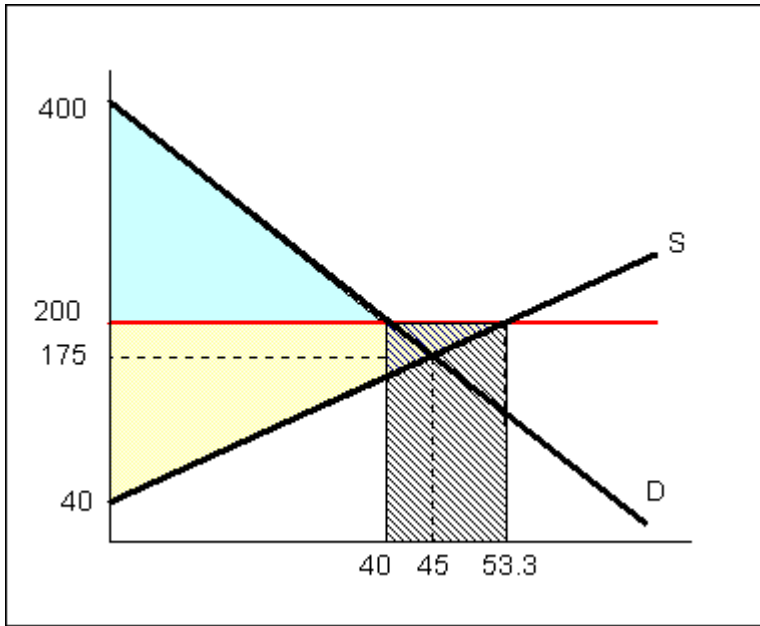


Econ 350 > Problem Set 1 > Answer Key

1. An economist would generally argue that the "right" amount of environmental improvements would be measured in terms of efficiency. The efficient amount of improvements would balance the marginal cost and marginal benefits of such improvements.
2. This is to emphasize that it is not just the type of residual that matters, but when and where it is discharged. A pollutant is something that causes damage, and the amount of damage caused depends on the assimilative capacity of the environment as well as the population and ecosystem resources exposed to the discharge. It's easy to give examples: noise from an airport close to a city as opposed to the same level of noise at a remote airport; airborne emissions during temperature inversions as compared to windy days, etc.
3. Whether or not employment should be sacrificed to save the spotted owl is a **NORMATIVE** issue; that is, it involves a statement of one's values and can not be answered with a definite answer. Economists, though, can attempt to measure the potential employment loss involved with any program to save the owl.
4. Zero pollution is unlikely to be the optimal level from society's point of view. The main reason is because the marginal cost of reducing pollution becomes exceedingly high as you approach zero pollution. The marginal benefits of reducing pollution will not justify cleaning up the last (expensive) bit of pollution.
5. We did this one in class.
6. The MC cost curve would run along the output axis (i.e, x-axis) until it reached $Q=1000$, at which point it would turn into a vertical line.
7. CAFE standards:
 - a) The expected environmental effect would be to have lower auto emissions and conserve on fuel consumption. However, these benefits assume no behavioral responses by auto makers and drivers. For example, auto drivers may now perceive that the "full cost" of driving a car has decreased since fuel economy has been increased. Thus, auto owners may be induced to drive more frequently or take the car instead of the plane for long trips. In addition, some people may now be induced to purchase a car because of the increased gas mileage. The effect on total gas consumption and, therefore, auto emissions is questionable.
 - b) One consequence of smaller and lighter cars is an increased probability of fatality on the highway for small car owners.
8. Supply & Demand:
 - a) Solve for equilibrium by setting $Q_d = Q_s$: $200 - 4P = 100 \implies P = 25$ and $Q = 100$.
 - b) The unusual feature of this market is the supply curve. The equation $Q_s = 100$ implies that supply is fixed (perfectly inelastic) at an output of 100.
9. Recycled paper market.
 - a) Set $Q_d = Q_s$: $400 - 5Q = 40 + 3Q \implies Q = 45$ and $P = 175$
 - b) $CS = 5062.50$; $PS = 3037.50$; Social Welfare = 8100
 - c) $CS = 4000$; $PS = 4264$; Taxpayers = -2660; Social Welfare = 5604; See graph below.
 - d) $CS = 5000$; $PS = 600$; Social Welfare = 5600; See graph below.



10. If price is artificially set below the market equilibrium, quantity demand will exceed quantity supplied; in other words, a shortage will result. Removing the price controls will allow prices to rise to their market levels. As prices rise, suppliers will expand production and consumers will cut back on their desired purchases. The net result will be increased trade in the market. In the short run, the lifting of price controls will harm those who were able to get food at the previously low prices. Also, those who administer the program are likely to be worse off as they will probably lose their jobs. Such "losers" could, in principle, be compensated by those who gain from lifting the price controls, perhaps through some sort of tax/subsidy program. Rising food prices might actually encourage more soil erosion as farmers step-up their planting in response to the higher prices.

11. See #11 below.

12. Bottled water market.

- a) Set $Q_d = Q_s$: $1150 - 100P = 400P - 100 \implies P = 2.5$ and $Q = 900$.
 b) $P = 3.0$ and $Q = 850$
 c) See table.

	Before	After
CS	4050	3612.50
PS	1012.50	903.12
Social Welfare	5062.5	4515.62

13. This one is straight out of the textbook.

14. Great Lake paper mills.

- a) Given free access, 6 new mills will locate on Great Lake, for a total of 10. Revenue for the tenth mill will be \$200, while private costs will be \$190, generating a positive economic profit for each firm, including the tenth, of \$10. The 11th mill would lose money. The profit-maximizing number of mills is 5 in total. The entry of the fifth plant causes total costs at all plants to rise by \$175, but revenues go up by \$200. The sixth plant, however, increases industry-wide costs by \$205 against revenue of only \$200. Thus industry profits fall as entry proceeds beyond five plants.
 b) Insert chart here.
 c) If the government restricts access to the lake to 9 plants in total, the lost profits to the 10th firm will be \$10 ($=200-190$). The increased profits to the 9 remaining firms equal the Profits After Restriction - Profits Before Restriction, or $9*(200-175) - 9*(200-190) = \135 .

15. Set $MSB = MSC$ to find the socially optimal output level. From the question we know that $MSC = 2Q$. Thus, $24 - 2Q = 2Q \implies Q = 6$. To find the market level of output, set $MPB = MPC$. Thus $24 - 2Q = Q$ which gives us $Q = 8$.

16. This is for you to ponder.

17. Think M&Ms!

18. Use the $\Sigma MB = MC$ rule for efficiency of public goods provision--this requires that we add up each person's WTP for a given amount of the public good. The optimal amount of SO₂ in the atmosphere is 900 units. The MC of reducing SO₂ is \$40 per unit. For 900 units, the $\Sigma MB = 10$ (Anna) + 30 (Heidi) + 0 (Sean) = 40. For 800 units, the $\Sigma MB = 0$ (Anna) + 20 (Heidi) + 0 (Sean) = 20. Thus, it's not worth it to clean up to 800 units--stop at 900.

19. Orange juice is a private good. In this case, optimality requires that we add up the quantities demanded for any given price. If the price of OJ is 40 cents, then the quantity demanded will be 2900 [= 1000 (Anna) + 800 (Heidi) + 1100 (Sean)].

20. Tuna fish market.

- a) Set $P_d = P_s$: $1000 - 8Q = 100 + Q \implies Q = 100$ and $P = 200$.
 b) CS = 40,000; PS = 5000; Social Welfare = \$45,000
 c) $MSC = MPC + MEC = (100 + Q) + (6Q) = 100 + 7Q$. The total external cost of tuna at $Q = 100$ is \$30,000. Net social welfare = \$15,000.
 d) Set $MSB (=P_d) = MSC$: $1000 - 8Q = 100 + 7Q \implies Q = 60$ and $P = 520$.
 CS = 14,400; PS = 23,400; total external cost = 10,800; Net social welfare = 27,000. Note that net social welfare is larger in part (d) than