Environmental Econ 8545

Review Questions -1st set.

Created new pdf file sept 2, 2002

I. Putting Environmental Economics in Perspective

1. Discuss how adding or deleting members of society affects whether an allocation is equitable, whether it is efficient. While formulating your answer give thought to future generations, individuals not yet alive, and animals.

2. Consider and discuss the distinction between a situation where all sentient beings are members of society, and a situation where only humans are member of society, but humans care about animals.

3. Does a member of society have to be an individual, e.g., a specific person or animal, or can a member be a group such as a species?

4. Identify for me one of your concerns about the environment, and discuss whether those concerns are efficiency based, equity based or both. Argue that your concerns can be described as efficiency based and/or, equity based, even if you believe they are not. One page or less please.

5. I live in the woods with Goldilocks and three bears. Goldilocks and I recently inherited a bunch of stuff. After receiving the UPS boxes of stuff, we traded our dead relatives’ trinkets until the only exchanges between the two of us that would make one better off would make the other worse. However, if either Goldilocks or I then trade some trinkets for honey both parties to that trade can be made better off without hurting the non-trading person.

   Before the trade with the bears, is society’s allocation of stuff efficient? Yes or No and explain.

Now consider another scenario.

I live in the woods with Goldilocks and three bears. Goldilocks and I recently inherited a bunch of stuff. After receiving the UPS boxes of stuff, we traded our dead relatives’ trinkets until the only exchanges between the two of us that would make one better off would make the other worse. However, if either Goldilocks or I then give the bears some trinkets for some honey, the bears are made better off, but the person is not made better off or worse off by the exchange.

Before the exchange with the bears, is society’s allocation of stuff efficient? Yes or No and explain.
6. Can one be an extreme environmentalist and still be a neoclassical economist? Argue yes and explain. Argue no and explain.

II. Welfare Economics: A Review

7. The famous economist Herkimer Snerd recently stated in a speech to the *Friends of Finance*, "If in money terms the gain to the gainers from an environmental policy is greater than the loss to the losers, the policy will make society better off and should be enacted." Is Herk correct? Discuss.

8. Assume one has a purely competitive society except for one monopolistic industry which is a heavy polluter. Will the allocation of resources become more efficient if the government can make the monopolistic industry competitive? Discuss your answer.

9. Demonstrate that pure competition is incapable of achieving an efficient allocation of resources when one or more of the following conditions prevail
   a. one person's utility depends on the amount of good X that another person consumes, i.e., $U^A(X^A,Y^A,X^B)$
   b. one of the resources important to society is a common property resource (e.g., $x = f(k, l)$ and $p_k = 0$)

10. Demonstrate that, under certain conditions, pure competition will lead to an efficient allocation of resources.

11. Define efficiency in the allocation of resources. Define equity. Define the optimal allocation of resources. Does society always prefer efficient allocations of resources to inefficient allocations? Use graphs to substantiate your points.

12. Explain, as if to an Econ. 2010 student, what is meant by the Social Welfare Function. What information does it contain? Does it play a role in the evaluation of government resource projects? Explain.

13. What is an externality? What is a private good? What is a public good? Explain, in words, why externalities and public goods cause market failure.

14. Define, and outline the differences between the
   a. Pareto Criteria
   b. Kaldor Criteria, and
   c. Scitowsky Criteria
15. a. Define what is meant by the term "market failure" (Don't define market failure by example)
b. Now define one specific type of market failure that plagues the natural resource/environmental sector of the economy. (Your definition of a specific type of market failure should also be example free)
c. Explain, as if to another individual in this class, the impact this specific type of market failure will have on the allocation of resources.
d. Now give an example of this type of market failure in the natural resource/environmental sector.
e. Now discuss two ways the government might correct your example of market failure. (Your discussion of corrections should consider their distributional implications and their political feasibility.)

16. When we discussed intertemporal efficiency conditions we obtained the result that efficiency requires that

$$MRS_{x_1x_2} = MRT_{x_1x_2}$$

where $X_i$ is the quantity of the aggregate good in period i. Discuss some conditions that, if they prevailed, would make attainment of this result inconsistent with efficiency.

17. When we discussed efficiency in exchange we determined that a necessary condition is that

$$MRS^m_{x_1x_2} = MRS^n_{x_1x_2}$$

where $m$ and $n$ denote two different individuals. When would this conclusion not be correct? Show me why?

18. Discuss the relationship between externalities and common property resources.

19. Does the shape of the contract curve denoting efficiency in exchange between two individuals depend on the cardinal properties of either individual's utility function?

20. Assume that electricity rates in Boulder increase because demand has increased due to a large net migration of people into Boulder. The increased electricity rates make you worse off. Is this an example of an externality? If so, how might the government correct it? Discuss.

21. Assume a world of two individuals (A and B) and three goods $X_1, X_2$ and $X_3$, where the three goods are available in the fixed quantities $X^A_1, X^A_2, X^A_3$ and $X^B_1, X^B_2, X^B_3$. Further assume that $U^A(X^A_1, X^A_2, X^A_3)$ and $U^B(X^B_1, X^B_2, X^B_3)$. Derive the conditions for efficiency assuming $X_1, X_2,$
and X₃ are all private goods.

22. Assume a 2 person (A and B), 2 good (X and Y) world where the two goods are available in the fixed quantities X and Y. Further assume that individual A's utility depends on the amount of good X that individual B consumes i.e., Uᴬ = Uᴬ(Xᴬ, Yᴬ, Xᴮ). 1) Verbally define efficiency in this world, 2) Derive and explain the mathematical conditions for efficiency, 3) Demonstrate, as formally as you can, whether pure competition will or will not achieve and efficient allocation of the goods.

23. Assume a two person (A and B), two good (X and Y) world where the two goods are available in the fixed quantities X = 10 and Y = 14. The initial allocations are Xᴬ = 6, Xᴮ = 4, Yᴬ = 9 and Yᴮ = 5. Further assume that Uᴬ = XᴬYᴬ and that Uᴮ = XᴮYᴮ - Xᴬ. Normalizing the price of good X to one (i.e., pₓ = 1), solve for the competitive equilibrium price (pᵧ) and quantities (Xᴬ, Xᴮ, Yᴬ, Yᴮ). In addition to the math, explain, in words, what you are doing. Now demonstrate, as rigorously as you can, that this competitive equilibrium is not efficient. Again, make sure to explain all of your steps. Now derive the efficiency locus (i.e., a function that describes the efficient amount of Yᴬ as a function of Xᴬ). Now determine, the tax rate, t, on individual A's consumption of good X that would cause the competitive equilibrium, in the presence of this tax, to be efficient.

24. One convenient way to express the willingness-to-pay relationship is to use the inverse demand function. The inverse demand function expresses the price consumers are willing-to-pay as a function of the quantity purchased. Suppose the inverse demand function (expressed in $) is p = 80 - q, and the marginal cost of producing it is mc = q, where p is the price of the product and q is the quantity demanded and/or supplied. How much should be supplied in a static efficient allocation? What is the magnitude of the net benefits from this allocation?

25. Suppose the state is trying to decide how many miles of a very scenic river it should preserve. There are 100 people in the community, each of whom has an identical inverse demand function given by p = 100 - q, where q is the number of miles preserved and p is the per-mile price he or she is willing to pay for q miles of preserved river. If the marginal cost of preservation is $500 per mile, how many miles should be preserved in an efficient allocation? How large are the net benefits?

26. Should multiplier effects be included as benefits in a benefit-cost analysis? Answer and discuss.

27. Does the existence of a common property resource always cause market failure.

28. Assume that everyone in an economy is doing the best they can given their constraints. Refer to this assumption as assumption A. Is fulfillment of assumption A necessary and/or sufficient for efficiency in the allocation of goods in an exchange economy? Convince the reader of your answer.
29. Define an efficient allocation of resources in an intertemporal context.

30. On page three of the welfare notes, I provide a prose definition of efficiency that is quite general. However, the mathematical characterization of efficiency that is presented on pages 12 and 13, and developed on pages 3 - 11) is restrictive in that it assumes no externalities or public goods. Try to develop a mathematical characterization of efficiency that allows for the possibility of externalities and/or public goods, and that would have the characterization presented on pages 12 and 13 as a special case. Start with just a general mathematical characterization of efficiency in production.

31. Assume a world that consists of two time periods. Denote the individuals in period 1 as generation 1, and denote the individuals in period two as generation 2. Assume a world of just two goods, cases of beer and copies of the book David Copperfield. Further assume individuals in generation 1 are willing to trade beer for books at the rate of 2 cases for one book, and generation 2 is willing to trade beer for books at the rate of one case for one book. Currently each generation has 10 cases of beer and 10 books. Is the current intertemporal allocation of beer and book efficient? Explain. Which generation is the literary generation? (Assume books are divisible; that is, generation 1 would trade one case of beer for a half of a book.)

32. Make a Coasian argument that the market will internalize externalities such that government intervention is unnecessary. Now argue that, in practice, government intervention will sometimes be required to eliminate the inefficiency caused by the externality

33. What is meant by the term property rights? If one owns the property rights for a resource, what powers are conferred by those rights.

34. What is a common property resource? Give me an example of an environmental resource that is a common property resource. Now provide an example of an environmental resource that is not common property resource.

35. What is an externality? Give me an example of an environmental externality? Give an example of an action by one economic agent that affects another economic agent that is not an externality. Explain why your example is not an externality.

36. Assume that the competitive firms in the widget industry produce excess air pollution from an efficiency perspective because the air is a common property resource. If this inefficiency is eliminated by a “pigouvian” tax air pollution, what will happen to the number of firms in the widget industry? Is this a good or bad thing?

37. What is a market transaction (trade)? Do not give me an example of a market transaction, but rather tell me what a transaction is, and what properties it must have to be a market transaction. How does a market transaction differ from other types of transactions? Now, give me an example of a market transaction. Now give me an example of a transaction that
is not a market transaction.

38. Explain, as if to an Econ. 7010 student, what is meant by a Social Welfare Function. What information does it contain? Why should those interested in policy be concerned with the notion of a social welfare function?

39. Discuss the relationship, if any, between externalities and common property resources.

40. What is an externality? What is a private good? What is a public good? Explain, in words, why externalities and public goods cause market failure.

41. Assume a world of two individuals (A and B) and three goods $X_1$, $X_2$ and $X_3$, where the three goods are available in the fixed quantities $X^1$, $X^2$, and $X^3$. Further assume that $U^A(X^A_1,X^A_2,X^A_3)$ and $U^B(X^B_1,X^B_2,X^B_3)$. Derive the conditions for efficiency assuming $X_1$, and $X_2$ are private goods, and $X_3$ is a public good.