1. “Poor environmental policy performance can result from choosing poor goals or poor strategies.” How can analysis of benefits and costs be used to assess a) goals and b) strategies?

2. Suppose Mytown has 2 playgrounds and 40 acres of wetlands, and there is a proposal to build more playgrounds. It takes 5 acres for each playground.
   a. Draw a figure that shows the technical rate of substitution between playgrounds and wetlands.
   b. Show the current allocation between playgrounds and wetlands.
   c. Explain what you still need to know to determine whether it is efficient for Mytown to convert some of its wetlands to playgrounds. What do economists mean by efficiency in this context? Assume you can get this information; How would you show it on your figure? (Be sure to label carefully.)
   d. Based on the assumptions you made in (c), would it be efficient for Mytown to convert some of its wetlands to playgrounds? Explain why or why not.

3. In analyzing benefits, economists point out that WTP and WTA are not necessarily equal. a) Why does this matter? b) Even though there is an intellectual debate over this issue, what is the practical advice for analysts who need to provide input for decisions? Does this practical advice tend to underestimate or overestimate the benefits of improving the environment or protecting ecosystem habitat? Explain how this under (or over) estimation still can yield useful input for decisions.

4. Compare and contrast the pros and cons of the travel cost method versus the hedonic method for estimating changes in nonmarket benefits. Be sure to mention at least one type of benefits that can, and one type that cannot, be measured by the travel cost method. Do the same for the hedonic method.

5. a) What is meant by the value per statistical life (VSL)? b) Given that we usually cannot identify individuals who died earlier because of environmental contaminants, why or how would this concept (VSL) be useful? c) We discussed at least 3 ways to estimate VSL. Choose one of these and describe its pros and cons for use in decisions about toxic substances. d) Page 90 of the EPA Guidelines recommends an estimate of $4.8 million in 1990, updating for the base year of the analysis. Why would you NOT want to use just this (updated) number when analyzing a toxic substance that can be life-threatening?

6. What do economists mean by averting behavior when talking about environmental problems? Why is it important to account for averting behavior when analyzing the benefits and costs to clean up contaminated drinking water? (Or, why would the estimates be incorrect if you left out averting behavior?)
7. Experts and lay people often have different judgments about the seriousness of environmental and renewable resource issues. We discussed the potential for their judgments to be influenced by their perceptions of the risks involved. Explain why their basic perspectives might differ, and a conceptual basis for expecting that lay people often tend to view a risk as more serious than the experts’ view.

8. Travel cost and hedonic methods are revealed preference approaches. a) Explain why we also need stated-preference approaches. b) Choose a stated-preference approach; describe how it is implemented, and its pros and cons.

9. CBA, p. 224, #1 (Ch. 9). Explain why for each.

10. a) What do economists mean by “benefits transfer” when analyzing environmental and natural resource issues? b) How would you evaluate whether the benefits transfer approach had been used appropriately in a particular analysis? (i.e., what factors should be considered when using a benefits transfer approach?) c) Why would the value-of-information concept be relevant when using the benefit transfer approach?

11. We almost never have as much information as we would like for a BCA, but decisions will be made anyway. Explain conditions under which imperfect, incomplete information still can shed light on the efficiency of a proposed action.

12. a) Define each and explain their differences: i) Benefit cost analysis, ii) Cost effectiveness analysis, iii) Economic impact analysis, iv) Equity analysis. b) Why do economists prefer BCA over the others? c) Why would it be important to consider each of the others in a real-world decision?

13. CBA, p. 224, #2 (Ch. 9)

14. Are command-and-control regulations more or less cost-effective than incentive based approaches for achieving environmental goals? Why?

15. Knowing about elasticities of demand and supply can help in understanding how producers and consumers will be affected by a proposed action that is designed to reduce production and consumption of a good for which social costs exceed private costs. Will the share of the costs for consumers (compared with producers) be larger or smaller if supply is very elastic rather than very inelastic? Hint: A diagram will help.

16. Non-market valuation methods for estimating environmental benefits often are placed in one of two categories: indirect or revealed preference, and direct or stated preference. What are the important differences between these two categories? What are two major advantages of each? What are two major disadvantages of each?

17. a) Why do economists stress the need for discounting? b) Why would the time pattern of benefits and costs matter? c) How would an analyst choose (and justify) one (or more?) discount
rates? d) What are the pros and cons of using OMB’s mandated 7 percent?

18. Suppose you have three projects to evaluate: Project 1 has $X in benefits for each of the next 20 years, and $Y in costs for each of the next 20 years. Project 2 has $X in benefits for each of the next 20 years, but the costs are mostly for an initial investment of $W that occurs at the beginning of Year 1. Project 3 has benefits that are small (say $0.25X) in the first 5 years but much larger (say $2X) in years 6-20, with an initial investment of $W and maintenance costs of $0.1W for 20 years. Suppose you know you will not have time to do a discounting analysis for all three projects. Would discounting be more important for Project 1, Project 2, or Project 3? Why?

19. CBA, p. 354, # 2 (Ch. 13)

20. CBA, p. 383, # 1 (Ch. 14)

21. CBA, p. 453, # 1 (Ch. 17) Hint for part c): Use BCA for this, not CEA.

22. Why would expected value be used in a benefit-cost analysis?

23. When would certainty monetary equivalents be used instead of expected values?

24. What circumstances would require a decision science approach (for instance, drawing and “solving” a decision tree) rather than simply calculating expected value?

25. a) What distinguishes exogenous and endogenous learning? b) Why might learning matter for a benefit-cost analysis? c) What difference does it make if the learning is exogenous compared with endogenous for a decision that has three options:

   Option A: large irreversible action
   Option B: small irreversible action, with potential to expand it later
   Option C: no action (i.e., continue protecting the wilderness resource)

26. Zebra mussels are an invasive species that entered US waters when ships from other countries emptied their ballast in the Great Lakes and St. Lawrence Seaway. Zebra mussels usually are smaller than a thumbnail. They clarify the water by eating organisms that make the water cloudy. However, they also attach themselves to underwater surfaces that include boat hulls, buoys, and water intakes (for public water supplies, hydro power plants, or industrial cooling). Boats move slower when their hulls are covered with mussels, and water intakes can become clogged. One option is to scrape the mussels from surfaces; assume this is the option being used now. Another option is to prevent their attachment by using paints containing pesticides such as tributyl tin (TBT). These paints can have impacts on other aquatic species, and need to be re-applied about once a year. Recently a few zebra mussels have been found in the Susquehanna River. Assume you work for PA DEP. Your boss wants a short but substantive description of how you would analyze the pros and cons of allowing the use of TBT paints on underwater surfaces in the Susquehanna River. Write that description, and indicate what major limitations you expect the analysis to have.
27. To allow restoration of elk in northwestern Pennsylvania, some habitat areas now have restrictions on hunting, camping and using snowmobiles. The elk are a popular tourist attraction. However, nearby residents complain that the elk damage crops and landscaping. We discussed several methods that could be used to estimate benefits, such as travel cost, hedonic property models, and stated preference (including contingent valuation and stated choice). Choose 1 of these methods and describe how you would design and conduct a study to estimate the benefits of this elk restoration. Now choose another approach. What would be the major shortcomings of a study using your first approach, compared with using the second approach?

28. Check the questions from the mid-term review list; many of those apply to the second part of the course.