

RESOURCE ECONOMICS PRELIMINARY EXAMINATION

January 10, 1993 ⁴

You have until 12:00 (four hours) to complete this examination. Exams will be collected promptly. Pace yourself in responding to the questions so that you do not spend an undue amount of time on any one question at the expense of other questions.

Part I: Answer all of the following three questions

1. There are five welfare measures emphasized by economic theory and policy analysts: equivalent variation (EV) and surplus (ES), compensating variation (CV) and surplus (CS), and the change in consumer surplus (ΔS). Discuss all five of these measures and their relationships to one another. Within your discussion be sure to include precise mathematical and economic definitions; magnitude comparisons; conditions for appropriate use; and relations to the Hicks test, the Kaldor test, WTP, and WTA. Indicate whether these five alternatives exhaust the set of available measures as well as the implications of this fact.
2. Suppose that the inverse demand for an exhaustible resource is given $p(t) = q(t)^{-1/4}$. Suppose further that the costs of extraction are zero, that initial reserves are $R = 1$ and the discount rate equals 0.10.
 - a. Solve for the time path of extraction of the competitive and monopolistic industries. How do the two time paths compare? Explain your answer.
 - b. Would your results in (a) change if the elasticity of demand were not the same each period? Explain your answer.
 - c. Would your results in (a) change if extraction costs were not zero? Explain your answer.
3. Over the past decade, the dairy industry in Central Texas, and Erath County in particular, has undergone major changes. Traditionally, small dairies were utilized where cows grazed on pastures. Recently, many large dairies with herds of 500 to 1,000 cows have begun operating in the area. These larger dairies confine many cows in small enclosures. The increased number of cows at concentrated sites have raised concerns that manure and nitrate loadings are threatening ground and surface water quality of the surrounding communities. Noting the severity of the problem the Environmental Protection Agency has issued a call for economic proposals to study this problem. The proposal requests that the resource economist propose at least two policy instruments that could potentially help curb this problem. Additionally, the proposal also request a detailed plan aimed at evaluating each proposed policy instrument. How would you, as a resource economist, develop such a proposal?

Part II: Answer one of the following two questions

4. Consider a country with two natural resources, A and B. For the country to survive some of each resource must be used, but the two resources are substitutes in many of their uses. Use of resource A contributes to global warming, whereas use of resource B leads to water pollution within the country. To help control global warming the government of this country is considering placing a tax on the use of resource A. Discuss how such a tax would accomplish this goal and the economic and environmental consequences of such a tax.
5. Define and rigorously discuss the concept of "market failure." Solutions to market failure often involve government intervention. Do you agree or not with this solution? Why or why not? Why is the concept of market failure pertinent to resource economists and how does it motivate and direct our efforts?