

# Resource Economics Preliminary Examination

March 27, 1997

You have until 8:15 to read the exam and ask any clarification questions. You then have until 12:15 (four hours) to complete this examination. Exams will be collected promptly.

Part I: Answer all of the following three questions
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1. Define and rigorously discuss the concept of "market failure". Why is this concept pertinent to resource economists and how does it motivate and direct our efforts? Solutions to market failure often involve government intervention. Do you agree or not with this solution? Why or why not?
2. If fish, forests, and minerals are all resources that can be depleted, why do we distinguish among them in resource economics? Describe and contrast three different models to explain the optimal use of these three resources? Where do they differ and why? What are the primary policy issues addressed by each of these models?
3. Suppose a textile mill discharges its waste into a river. The total damages from the discharges are given by  $TD = 4Q + 5Q^2$  where  $Q$  is the quantity of wastes discharged. The total benefits to the textile mill of discharging its wastes into the river are given by  $TB = 60Q - 2Q^2$ .
  - (a) What level of discharges would occur if the textile mill may freely discharge its waste into the river?
  - (b) What is the efficient level of discharges?
  - (c) Assuming the textile mill ignores the damages it causes, the efficient level of discharges could be attained by levying a Pigouvian tax (in dollars per unit of discharge) of what size?
  - (d) If transaction costs are zero and negotiations occur between the textile mill and the victims suffering the damages, what will be the optimal level of pollution?
  - (e) Suppose the TB function is known with certainty but we are uncertain about the TD function. Which would be the better type of instrument for the government to use, a pollution tax or a standard? Why?
  - (f) Returning to the certainty case, suppose the textile mill is in one country and the victims suffering the damages are located in another. How does this complicate the resolution of the externality, and what would you propose as a solution?

Part II: Answer one of the following two questions

4. In June of 1995, a Texas grain farmer used an airplane to spray his fields with a herbicide to control weeds. About two weeks after this event, a neighboring cotton farmer reported something wrong with his cotton plants. An inspection by the Texas Department of Agriculture verified that the cotton plants showed damage consistent with herbicide poisoning, and chemical analysis of samples detected the presence of the herbicide compound. The cotton farmer sues the grain farmer for damages.

As an expert witness, please discuss in detail the approach that you would use to assist the court in this suit. Please be specific in terms of the economic basis of your argument, damages, if any, to which the cotton farmer may be entitled and data and other information that you would need to estimate the dollar amount of damages due the cotton farmer, if any.

5. There is currently a great debate in the U.S. and in Texas about private property rights. Many laws are being passed to protect private property rights. Using principles of resource economics, either defend or debate the perception that if a person owns a piece of property, she/he has the right to manage that property as she/he desires.