Questions and Problems, II (maximum of 100 points out of 90)

Instructions: Each problem is keyed by the number of points it is worth and the minimum page length. The page length refers to a page with one inch margins, times new roman font, and a font size of 12. A page will have a minimum of 23 double spaced lines. Include your name and question/problem number at the top of the page. This allows 20 lines for your response. Your response is to be typed, however, you may do mathematical calculations and graphs neatly in pen or pencil. Question/problems prefaced with an asterisk (*) are required. You may turn in as many questions/problems as you like, but the maximum number of points that can be earned is given at the top for each set. No questions/problems will be accepted after the assigned due date.

9-1 (10 pts, 1 page) Plot the nominal and real price of U.S. oil, US Oil Prices 1949-2000. Use the CPI Price Deflator with year 2000 as the base year.

9-2 (10 pts, 1 page) Discuss the three security issues for the U.S. associated with the large oil holdings of OPEC nations.

9-3 (10 pts, 1 page) Contrast the geologist and economic approach to the question: “Will petroleum become scarce?”

9-4 (10 pts, 1 page) Why does the author of the text believe the best description of the oil market is “competition hybrid?”

*9-5 (15 pts, 1 ½ page) Summarize the recent debate held by Resources for the Future panelists on the three issues that are the heart of President Bush’s energy bill passed by the House this summer. Access the panelists consensus with respect to the bill.

*10-1 (10 pts, 1 page) Discuss the two basic cases from the Limits to Growth analysis. How do they differ, what are their end results, and how do the end results come about? How are these cases similar to Malthus’ laws of population?

10-2 (10 pts, 1 page) Explain why economists were very critical of the Limits to Growth approach.

10-3 (10 pts, 1 page) Discuss Bill McKibben’s assessment of Joel Cohen’s book How Many People can the Earth Support in “Reaching the Limit.”

10-4 (10 pts, 1 page) Discuss the Ehrlick-Holder Identity. If we are to limit pollution, which part of the identity do you believe is most likely to receive the attention of policy makers? Why? Which part of the identity is most likely to move in a favorable direction, i.e., to limit pollution, as a consequence of individual decisions in pursuit of their self-interest? Why?

*11-1 (10 pts, 1 page) Consider a production process that generates pollution, POLL, as a by-product of its output, Q = q(POLL). The pollution creates an external cost, TEC = h(POLL) = n(Q). Specifically, assume the annual demand for the product is given by: Q_D = 100 - 2.5P, where P is the unit price of the output. Assume annual supply is given by Q_S = 2.5P. Further suppose the annual total external cost as a function of output is TEC = 0.05Q^2. Using calculus, we can derive
the marginal external cost, MEC, equation as MEC = 0.1Q. Show the competitive and efficient 
equilibrium graphically. Include the MEC and the marginal social cost, MSC, curves in your 
diagram. What is the optimal Pigouvian tax? Impose the optimal tax on suppliers and recalculate 
the competitive equilibrium. What is the loss of consumer surplus, the loss of producer surplus, 
the gain in tax revenues, the cost savings due to less pollution, and the net gain to society as a 
result of the tax? How does the Pigouvian tax policy affect the Q = q(POLL) and TEC = h(Q) 
functions? Show the problem and policy graphically.

11-2 (10 pts, 1 page) Consider two polluting sources, C and D, in a region. Current emissions are 
10 units of pollution each for a total of 20 over the period. Suppose the objective is to reduce 
emissions by 50%. The policy is to implemented by requiring each source to clean up 5 units. 
Assume the total abatement costs, TAC, are given by TAC\(_C\) = 1.25A\(_C\)^2 and TAC\(_D\) = 0.3125A\(_D\)^2 for 
the two sources C and D respectively. A\(_C\) and A\(_D\) are the units of abatement undertaken by C and 
D respectively. What is the total cost of abatement for each source and for the region? Is this cost 
effective? That is, are the 10 units being cleaned up at minimum cost? The condition necessary for 
cost to be minimized is the equality of marginal abatement cost, MAC. Using calculus, we can 
find MAC by taking the first derivative of TAC with respect to A. For the two sources, their 
marginal abatement costs are given by: MAC\(_C\) = 2.5A\(_C\); and MAC\(_D\) = 0.625A\(_D\). What clean up 
assignment is cost effective? What would be the cost to each source and to the region of a cost 
effective clean up?

11-3 (5 pts, \(\frac{1}{2}\) page, Only in conjunction with 11-2) Consider a policy of a pollution charge for 
the problem in 11-2. Specifically suppose the charge is $5 for each unit of pollution emitted. That 
is, each source has an option of cleaning up emissions, or paying a $5 charge for each unit of 
emission. How many units will each source abate? What is the cost of this policy to each source 
and to the region? Discuss what would happen if the pollution charge were $4 rather than $5. If 
the charge was $6 rather than $5. Show graphically how a pollution charge leads to cost effective 
abatement. Use two diagrams with MAC and the pollution charge on the vertical axes and 
emissions on the horizontal axes. How does the pollution charge affect the Q = q(POLL) 
relationship? Does it affect the TEC = h(POLL) relationship? See question 11-1.

11-4 (5 pts, \(\frac{1}{2}\) page, Only in conjunction with 11-2) Consider a policy of marketable permits for 
the problem in 11-2. Specifically suppose the region issues 10 permits each of which allows the 
holder to emit one unit of pollution. Suppose further that the region assigns the permits on the 
basis of a source’s historical discharge. In this case, each source receives five permits. Initially 
who will offer to buy permits and who will offer to sell? Explain. In equilibrium, the price of the 
permits should equal the marginal abatement costs. In equilibrium, how many units will each 
source abate? What is the cost of this policy to each source and to the region? Discuss what 
would happen if fewer permits were issued. If more permits were issued. How does the 
marketable permit policy affect the Q = q(POLL) relationship? Does it affect the TEC = h(POLL) 
relationship? See question 11-1.

11-5 (15 pts, 1 \(\frac{1}{2}\) pages) Discuss the primary impacts of the Clean Air Act on specific pollutants 
and health. Summarize the Cost Benefit Analysis of the Clean Air Act presented in the text.
11-6 (10 pts, 1 page) Discuss the problem of “acid rain” and the policy implemented in 1990 to deal with the problem.

*12-1 (15 pts, 1 ½ page) Discuss the primary impacts of the Clean Water Act on health and ecosystem protection. Summarize the Cost Benefit Analysis of the Clean Water Act presented in the text.

12-2 (10 pts, 1 page) Discuss the efficiency problems associated with the Clean Water Act and cost-effective policies similar to those adopted with respect to clean air might be used to improve the picture.