

ECON 275 – 70: ENVIRONMENTAL ECONOMICS – Take Home Exam 2
(40 points total)

The following are the rules relating to the take-home exam.

1. The take-home exam must be returned by 11:59 pm on **Sunday, November 8, 2020**. Please upload your file in Canvas. A Microsoft Word file is preferred.
2. NO late exams will be accepted.
3. You may not discuss the exam in any way with anyone until the exam period is over.
4. It is preferable that the exam be typed in a font size of 12 point. Single or 1.5 spacing is fine. Please make it easily readable.
5. If you need to draw diagrams and prefer to do by hand, kindly take a picture of the diagram and copy and paste it into the submitted exam.
6. Any violation of the rules regarding consultation with others will be considered honor code violations. In addition, violation of rules regarding consultation or lateness will lead to assessment of penalties in grading (regardless of whether honor code action is taken). Please sign the Honor Statement and submit it along with your exam.

“I affirm that all work on this exam is my own and that my conduct regarding the exam is consistent with the highest standards of academic integrity.”

Name: _____

YOU MUST DO ALL PROBLEMS. PLEASE SHOW ALL WORK AND MAKE SURE TO READ EACH QUESTION CAREFULLY AND ANSWER EACH QUESTION FULLY.

1. **(10 points total)**. Recycling or reuse of resources, is an important part of sustainability because it reduces the negative human impact on the environment and helps reduce the pressure on natural resources. Nevertheless, it is not a panacea, and as with everything, there are benefits and costs. As an example, the following article “[Why the World’s Recycling System Stopped Working](#)” ([PDF](#)) discusses problems with world’s recycling system.

Recognizing there is no clear-cut solution, the country of DCM is, nevertheless, planning on making a significant investment in setting up recycling facilities throughout the country. DCM has embraced the new economic model of a “circular economy” as discussed in “[Towards a Circular Economy: Business Rationale for an Accelerated Transition](#)” and “[The Circular Economy In Detail](#).” ([PDF file of diagram](#)). Links are also available on course website.

Based on your “expertise” in environmental economics, you have been hired as a consultant to the country of DCM to assist them in their investment planning. **In a minimum of 1000 words**, provide the country of DCM with your recommendations on how to best achieve their goal. In your analysis be sure to distinguish between biological and technical materials.

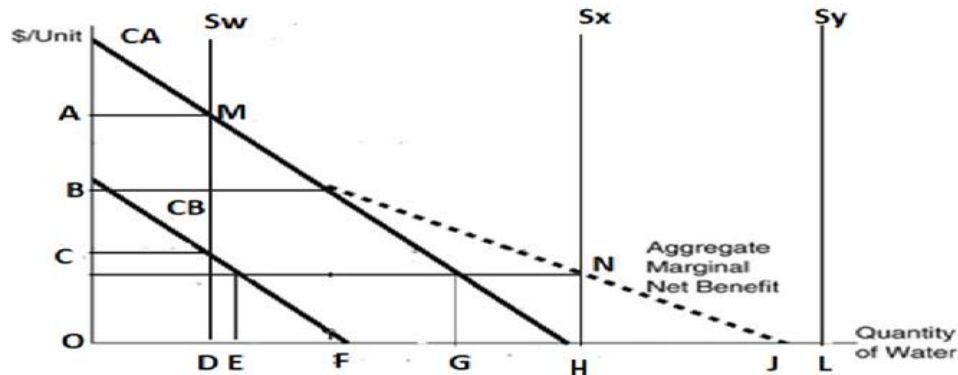
2. **(8 points total)** Consider a two-period model in which there is a fixed supply of a depletable resource. The demand for this resource is constant over both periods and is given as:

$$P = 88 - .44Q \quad \text{and} \quad MC = 22$$

There is an initial resource endowment (supply) of 350 units of the depletable resource.

- a. **(2 points)** Based on this information, what is the amount of the resource extracted in each period. Show your work as well as a graph showing the outcome in each period.
 - b. **(3 points)** Now suppose the initial resource endowment (supply) is now given to be only 200 units of the good and you are told the discount rate (factor) is determined to be 10 percent. Given this information, how much of the resource will be extracted in time period 1 and time period 2 if you desire to satisfy the condition that the present value of the marginal benefit from the last unit in period 1 equals the present value of the marginal net benefit in period 2.
 - c. **(2 points)** Based on the quantities you determined in (b) graphically show this **Dynamically Efficient Allocation** situation. Calculate the prices and label the prices and quantities in each period on the graph.
 - d. **(1 point)** What are the values of the marginal user cost in each period?
3. **(6 points)** Choose a major city in a developing country ([List of Developing Countries](#)) that is facing environmental problems (that is really most cities in a developing country). In a minimum of **500 words**, explain the current situation to someone unfamiliar with environmental economics and suggest economic and/or political policies that could be implemented to address the issues.
4. **(4 points)** Assume an increasing marginal-extraction-cost model of the allocation of a depletable resource with a renewable substitute (refer to text and/or notes for graph). Showing diagrammatically, what happens if:
- a. **(2 points)** A per-unit tax is imposed by the government on each unit of the depletable resource used. Be sure to show the new effect on (i) marginal extraction cost and marginal user cost; (ii) quantity extracted; and (iii) switching point.
 - b. **(2 points)** Now on a new graph, show diagrammatically what happens to the (i) quantity extracted; and (ii) switching point if technological development in resource extraction reduces the extraction cost for each unit by an amount equal to the per-unit tax.

5. (3 points) The following article looks at the top [10 Countries With the Worst Drinking Water](#). Choose two countries and write a paragraph on each explaining why the current situation exists.
6. (3 points) I know you are most likely not interested in the USA election and may not know what is going on. However, for your information, President Trump claims former Vice President Biden is against fracking while Trump support this method of obtaining oil and natural gas. Which person's position would you support and why? Pretend you are speaking for either candidate during a debate. State and support you position in at least **250 words**.
7. (2 points) You have decided to design an environmentally friendly house in which to live. Discuss at least three features you would incorporate in the design and explain both the economic and environmental benefit of each.
8. (2 points) Refer to the diagram below to answer the following questions.



Suppose there are two neighboring countries (*Avacadoland* and *Bananaland*) that use the same source of water. The marginal net benefit (MNB) for *Avacadoland* is represented by the line CA and the marginal net benefit (MNB) of *Bananaland* is represented by the line CB. Fill in the blanks below with the appropriate letter(s).

If the water supply line is S_x , the total quantity of water demanded is _____, the quantity of water used by *Avacadoland* is _____ and the quantity of water used by *Bananaland* is _____.

If the water supply line is S_w , the total quantity of water demanded is the _____, the quantity of water used by *Avacadoland* is the _____ and the quantity of water used by *Bananaland* is _____.

If the water supply line is S_y , the total quantity of water demanded is the _____, the quantity of water used by *Avacadoland* is the _____ and the quantity of water used by *Bananaland* is _____.

9. (2 points) What is meant by the Hartwick Rule? Construct a real-world example that would illustrate this concept.