

Instructions

Answer all questions in the answer packet provided. Put your name on the packet. Write legibly. You may use a dictionary but no other outside material. Answers not fulfilling any of the above will not be graded. 60 total points are available on this exam. The value of each question is shown next to the question.

I will grade all tests and papers as soon as possible and then announce a date for you to review the exam. Quibbles about grading are admissible, but objections must be submitted in writing, double-spaced, and typed. Explain what you thought the question meant, what you meant, and how your answer accomplished your goals. If your appeal seems reasonable, I will adjust your score.

Question 1 (1 point)

Define *sustainable development* as described by the World Commission on Environment and Development.

Question 2 (15 points) Answer the following questions by saying if the following statements are *true* or *false* and explain why:

- a) (3 points) Open-access only leads to a problem for non-renewable resources because nonrenewable resources cannot regenerate, whereas renewable resources can regenerate.
- b) (3 points) When considering a dynamic constraint for a renewable resource, it is *never* possible that the growth rate is lower than the harvest rate, because this would imply a negative resource stock.
- c) (3 points) If a developing country does not value the species living in the country's forests, then policies should not prevent slash-and-burn agriculture due to the resulting revenues which can help overcome poverty.
- d) (3 points) Consider the Krugman North-South trade model. If both sectors (agriculture and manufacturing) in each country face increasing returns to scale, uneven development does not automatically exist, even when one country's capital stock is bigger in the beginning.
- e) (3 points) In the real world, trade occurs according to a country's comparative advantage and leads to misuse of the world's resources because factors outside the market place tend to be ignored.

Question 3) (11 points)

A country currently has a stock of trees of which T are harvested in any one period. Trees are a renewable open-access resource that grow at rate $f(T) = (\tilde{T} - T) \cdot T$, where \tilde{T} is the carrying capacity of the land for trees (the maximum number of trees possible). Trees are the only resource available in the economy. Define w as the per unit cost of harvesting trees, such that total costs (TC) of harvesting trees is $TC = wT$. Define p as the per unit market price of trees.

- a) (3 points) On a graph, show the quantity of trees harvested and resulting profits (i) if the trees are an open access resources, and (ii) if the trees were optimally managed (the socially efficient amount of trees harvested). Be sure

to label and explain your graph. *Note:* the total revenue function should be U-shaped beginning at (0,0).

- b) (3 points) Now solve the problem algebraically. Set up the profit function and determine the amount of trees cut down (i) if the trees are an open-access resource, and (ii) if the trees were optimally managed (the socially efficient amount).
- c) (2 points) Explain why these scenarios lead to different results.

Now imagine the following: An institutional constraint is introduced to overcome the problem of open-accessibility. β represents some impact of institutions on the cost of chopping down trees. The presence of such effects increases the average costs of cutting down.

- d) (3 points) How could the total cost function (TC) look like, if $0 < \beta \leq 1$ and the following constraint should hold $c_T(w, T, \beta) > c_T(w, T)$ with c_T denoting the average costs? Show this scenario in your graph of a).

Question 4 (9 points total)

Read the following article carefully from “A petrodollar saved” in the Economist (September 4, 2008)

As prices fall, can sovereign-wealth funds break the resource curse?

COUNTRIES flush with oil and ore should grow faster than those that are barren. Puzzlingly, they often do not. Natural-resource income is spent rashly or invested at the expense of other sectors of the economy. Thus, by introducing natural-resource funds this problem might be solved. Natural-resource funds mostly serve one of two purposes. Savings funds, such as Norway’s Government Pension Fund, transfer resource wealth across generations by building portfolios that aim to provide returns long after the oil has run dry. Stabilization funds, such as Chile’s Economic and Social Stabilization Fund, smooth out the economic cycle by accumulating revenues from commodity exports when prices are high, and disbursing them when prices drop...

- a) (2 points) What is the purpose of a natural resource fund?
- b) (3 points) Which conditions determine the ability of natural resource funds to aid in sustainable growth?
- c) (4 points) Should countries potentially suffering from a resource curse establish these resource funds before or after a curse has been verified? Explain your answer using at least one political and one economic reason for the existence of resource curses.

Candidate questions (24 points total)

Three questions will be drawn at random from the candidate questions you have been previously given. Of these three, you must answer any **two**. Please indicate clearly on your answer which question you are answering. Each question is worth 12 points.

Question 5 (12 points) Candidate question

Question 6 (12 points) Candidate question