

EXAM IN SØK3524**MILJØ- OG RESSURSØKONOMI****ENVIRONMENTAL AND RESOURCE ECONOMICS**

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Date: 17.12.2010
Exam location: Dragvoll
Number of hours: 6
ECTS: 15
Allowed: Flg formelsamling: Knut Sydsæter, Arne Strøm og Peter Berck (2006): Matematisk formelsamling for økonomer, 4utg. Gyldendal akademiske. Knut Sydsæter, Arne Strøm, og Peter Berck (2005): Economists' mathematical manual, Berlin.
Calculator: Citizen SR-270x el. HP 30S.
Pages: 2
Exam-results: 17.01.2011

Question 1 (33%)

- a) Use the Gordon-Schaefer assumptions, $F(X) = rX(1 - X / K)$ and $q = \theta EX$, and formulate an equilibrium fishery model. Find the stock size, effort use and catch under sole owner management as well as under 'open-access'.
- b) Discuss some management implications based on what you found in a).

Question 2 (33%)

- a) Discuss briefly the Environmental Kuznets Curve (EKC) concept.
- b) Formulate the basic equations describing a simple emission quota trading scheme.
- c) Discuss briefly the difference between a stock and flow pollution problem.
- d) Elinor Ostrom won the Nobel Prize in Economics 2009 for her work on local common management problems. Describe briefly Ostrom's main arguments.
- e) Find Faustman's rule

SØK3524 Environmental and Resource Economics

Question 3 (33%)

You are appointed as a manager of a national park where elephants is the wildlife stock. The growth of the elephant stock is given by $dX_t / dt = F(X_t) - q_t$. q_t is the number of elephants hunted. The current net benefit (profit) of the park activities is described by $\pi_t = pq_t + wX_t$. pq_t is the income from safari hunting with p as the fixed hunting price while wX_t is the non-consumptive tourist income with w as the fixed marginal 'viewing' income.

- Formulate the management problem when the present-value net benefit (profit) is to be maximized. Find and interpret the necessary conditions for maximum.
- Find the long term equilibrium (steady state). Will the stock size be located to the left hand or right hand side of X_{msy} ? Discuss also how the dynamics leading to the steady state will be.

The elephants are also destroying crops of the local people living close to the national park. The money value of the crop damage is given by $D_t = \alpha X_t$ where α is the fixed damage per animal. The current net social benefit of the elephant population is therefore given as $U_t = pq_t + wX_t - \alpha X_t$.

- Solve the elephant management problem when the present value social net benefit is to be maximized. Find the steady state. What are the differences compared to b)? Finally, discuss some possible policy implications.