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Department of Economics

Examination paper for SØK3524 Environmental and Resource Economics

Examination date: May 14, 2021

Examination time (from-to): 09:00-15:00

Permitted examination support material: A / All support material is allowed

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If you experience technical problems during the exam, contact Orakel support services as soon as possible before the examination time expires. If you don't get through immediately, hold the line until your call is answered.

OTHER INFORMATION

Make your own assumptions: If a question is unclear/vague, make your own assumptions and specify them in your answer. Only contact academic contact in case of errors or insufficiencies in the question set.

Cheating/Plagiarism: The exam is an individual, independent work. Examination aids are permitted, but make sure you follow any instructions regarding citations. During the exam it is not permitted to communicate with others about the exam questions, or distribute drafts for solutions. Such communication is regarded as cheating. All submitted answers will be subject to plagiarism control. [Read more about cheating and plagiarism here.](#)

Citations: We do not require citations/referencing.

Notifications: If there is a need to send a message to the candidates during the exam (e.g. if there is an error in the question set), this will be done by sending a notification in Inspira. A dialogue box will appear. You can re-read the notification by clicking the bell icon in the top right-hand corner of the screen. All candidates will also receive an SMS to ensure that nobody misses out on important information. Please keep your phone available during the exam.

Weighting: All questions are weighted equally.

ABOUT SUBMISSION

How to answer questions: All question types other than Upload assignment must be answered directly in Inspira. In Inspira, your answers are saved automatically every 15 seconds. **NB!** We advise against pasting content from other programs, as this may cause loss of formatting and/or entire elements (e.g. images, tables).

File upload: When working in other programs because parts of/the entire answer should be uploaded as a file attachment – make sure to save your work regularly.

All files must be uploaded before the examination time expires.

The file types allowed are specified in the upload assignment(s).

30 minutes are added to the examination time to manage the sketches/calculations/files. The additional time is included in the remaining examination time shown in the top left-hand corner.

NB! You are responsible to ensure that the file(s) are correct and not corrupt/damaged. Check the file(s) you have uploaded by clicking “Download” when viewing the question. All files can be removed or replaced as long as the test is open.

[How to digitize your sketches/calculations](#)

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Automatic submission: Your answer will be submitted automatically when the examination time expires and the test closes, if you have answered at least one question. This will happen even if you do not click “Submit and return to dashboard” on the last page of the question set. You can reopen and edit your answer as long as the test is open. If no questions are answered by the time the examination time expires, your answer will not be submitted. This is considered as “did not attend the exam”.

Withdrawing from the exam: If you become ill, or wish to submit a blank test/withdraw from the exam for another reason, go to the menu in the top right-hand corner and click “Submit blank”. This cannot be undone, even if the test is still open.

Accessing your answer post-submission: You will find your answer in Archive when the examination time has expired.

1 Exam SØK3524 V21

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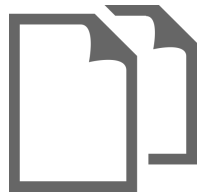
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Maximum marks: 10

Question 1
Attached



Eksamen SØK 3524 0521

You may submit your answer in English, Norwegian, Swedish or Danish.

Question 1 (1/3)

Consider an extraction problem (oil, mineral) that takes place over two years. The current profit in year t is defined through $\pi_t = pq_t - (c/2)q_t^2$, with q_t as the extraction (output), p as the fixed output price and c as a cost parameter. The resource constraint reads $q_0 + q_1 \leq X_0$ where X_0 is the initial size of the resource stock. The firm aims to find the extraction that maximizes present-value profit.

a)

Formulate the optimization problem and find the optimal extraction when it is profitable to extract in both periods. How do the discount rate and the price influence the extraction? When is it not optimal to extract in the second period?

b)

Formulate and discuss the more general problem where the extraction takes place over $T > 2$ years.

Question 2 (1/3)

a)

Discuss briefly the concept of 'sustainable development'.

b)

Analyze how economic growth may influence a certain pollution problem through the so-called IPAT model.

c)

Discuss some basic forces working in the direction of a high exploitation pressure of a fish stock. Why is it very often necessary to regulate a fishery? Discuss possible regulating instruments.

d)

Discuss briefly what insights an age-structured fishery model may give compared to the standard biomass model.

Question 3 (1/3)

A landowner is controlling a wildlife stock that grows according to $dX/dt = F(X) - h$. Hunting licences are sold for a fixed price p per animal shot. The wildlife stock also earns a value due to tourism (wildlife viewing) assumed to be related to the stock, $W = W(X)$ with $W' > 0$. The current profit of the landowner hence writes $\pi = ph - W(X)$.

a)

Formulate the optimal management strategy of the landowner when the goal is to maximize present-value profit. Consider both the transitional dynamics and the steady-state.

b)

Find how the price p and the discount rate δ influence the optimal steady-state stock and hunting.

c)

Assume that the natural growth is governed by the logistic function $F(X) = rX(1 - X/K)$. Interpret the parameters of this function. Finally, find how these parameters influence the above optimal steady-state.