

UNIVERSITY OF OSLO

DEPARTMENT OF ECONOMICS

Take home exam: **ECON5200/9200 – Advanced Microeconomics**

Exam period: Monday 5 December at 10.00 to Thursday 8 December at 11.00

Guidelines:

Submit your exam answer electronically to: submissions@econ.uio.no. Last day for submission is **Thursday 8 December at 11.00**

Written text should be in pdf format.

Use your candidate number, both as the name of the file you submit, and as the author name in the file. Do NOT use your name! You will find your candidate number on your StudentWeb. If you have problems, please contact the Department of Economics.

Further instructions:

- The questions are in English, and your answers must be given in English.
- Students on master's level are awarded on a descending scale using alphabetic grades from **A** to **E** for passes and **F** for fail. Students who would like to have the course approved as a part of our phd-program, must obtain the grade **B** or better. Students on phd-level are awarded either a passing or failing grade. The pass/fail scale is applied as a separate scale with only two possible results.
- Your answer must fill the formal requirements, found at <http://www.sv.uio.no/studier/ressurser/skriver%C3%A5d/sv.html> (Norwegian) or at <http://www.sv.uio.no/english/studies/resources/sources-and-references/> (English).
- It is of importance that your paper is submitted by the deadline (see above). Papers submitted after the deadline, **will not be corrected.***)
- All papers must be submitted electronically to the address given above. You must not submit your paper to the course teacher.

*) The standard regulation for illness during exam also applies for the home exams. Please see <http://www.uio.no/english/studies/admin/examinations/illness-postponed/index.html> for further details.

Each problem is given one third weight, and the sub-problems count equally within each of the three problems.

Problem 1

Please read carefully “Other-regarding preferences in general equilibrium” by Dufwenberg et al., in *Review of Economic Studies* **78**, 613–639 (2011).

- (a) Discuss the definition of “separability” in the context of other-regarding preferences (ORPs) and provide an example where this assumption is not compelling (i.e. it might be violated in reality).
- (b) Explain why profit maximization might fail. Then, for the case of well-being externalities, discuss whether profit maximization can be recovered by imposing the condition of “social monotonicity” (SM).
- (c) In Section 4, Dufwenberg et al. (2011) distinguish between well-being externalities and opportunity-based externalities. What are meant by these concepts?
- (d) For the case of well-being externalities, intuitively explain why the second welfare theorem holds (given SM), while the first welfare theorem fails.
- (e) In the ORPs of individuals, replace budget sets by the following specific opportunity sets. For each individual $i \in I$ and each bundle $x_i \in \mathbb{R}_+^L$, let her opportunity set at x_i be $O_i(x_i) \equiv \{\bar{x}_i \in \mathbb{R}_+^L \mid \bar{x}_i \leq x_i\}$. Argue that, in this case, the cases of well-being externalities and opportunity-based externalities are equivalent in terms of welfare properties.
- (f) Following MWG (Section 19.D), propose an extension of the risk-free opportunity-based externality model of Dufwenberg et al. (2011) to Radner’s concept of equilibrium for the case of uncertainty. Define a version of the equilibrium concept, of efficiency (Def.4), and of the condition of “redistributional loser property” for your extension and justify your choice. [You do not need to establish a counterpart of Theorem 4 of Dufwenberg et al. (2011)].

Problem 2

Please read carefully “Introduction to repeated games with private monitoring” by Kandori in *Journal of Economic Theory* **102**, 1–15 (2002).

- (a) What is meant by the folk theorem in δ -discounted infinitely repeated games with perfect monitoring? Give conditions under which the folk theorem holds; see e.g. “The folk theorem in repeated games with discounting or with incomplete information” by Fudenberg and Maskin, *Econometrica* **54**, 533–554 (1986).
- (b) Explain what is meant by perfect (public) monitoring, imperfect public monitoring, and imperfect private monitoring? What is meant by public strategies and perfect public equilibria? Why is establishing folk theorems in the case of (perfect or imperfect) public monitoring simpler than establishing folk theorems in the case of imperfect private monitoring?
- (c) In δ -discounted infinitely repeated games with (perfect or imperfect) public monitoring, dynamic programming techniques can be used to characterize the set of perfect public equilibrium payoffs through the concept of a ‘self-generating’ set of payoffs, a concept analyzed by Abreu, Pearce and Stacchetti in “Toward a theory of discounted repeated games with imperfect monitoring”, *Econometrica* **58**, 1041–1063 (1990), building on “Optimal Cartel Equilibria with Imperfect Monitoring”, *Journal of Economic Theory* **39**, 251–269 (1986). What is a ‘self-generating’ set? Explain how this concept can be used to analyze δ -discounted infinitely repeated games with perfect monitoring. Consider the following δ -discounted infinitely repeated prisoners’ dilemma game.

	L	R
T	4, 4	-1, 5
B	5, -1	0, 0

Show that $\{(1, 3), (3, 1)\}$ is a ‘self-generating’ set if $\delta = \frac{1}{2}$.

- (d) Ely and Välimäki (“A robust folk theorem for the prisoner’s dilemma” in *Journal of Economic Theory* **102**, 84–105, 2002) use dynamic programming techniques to prove a folk theorem result under imperfect private monitoring in the repeated prisoners’ dilemma game. How do their approach differ from that of Abreu, Pearce and Stacchetti?

Problem 3

Please read carefully “Perspectives on mechanism design in economic theory” by Roger B. Myerson, in *American Economic Review* **98**, 586–603 (2008). This article is based on Myerson’s Nobel Prize lecture.

- (a) Consider the buyer-seller problem in Section II. Although Myerson does not derive the Vickrey-Clark-Groves mechanism(s) for this problem, please do this yourself.
- (b) For this problem, please also derive the Expected Externality mechanism, which we talked about in class.
- (c) Do you know important conditions that are, and are not, satisfied by the Expected Externality mechanism?
- (d) In Section II, at the end of part E (p. 595), it is suggested that nonsymmetric mechanisms would not be necessary, since the symmetric mechanism “remain incentive-efficient in this more general class of nonsymmetric mechanisms.” How do you suggest to change the model/payoffs slightly, so that nonsymmetric mechanisms would actually have been better? (You do NOT need to derive the optimal nonsymmetric mechanism.)
- (e) Consider now the problem of how to pay the manager “under socialism” in Section III, part A (p. 599). Suppose we change the model so that in addition to the payoffs stated in the text, (i) the manager must pay some private cost c if the project is implemented (where c can be interpreted as the effort-cost

that is required by the manager). Also, (ii) the manager gets some private value b if the project is both undertaken and successful. Set up the two new incentive constraints.

- (f) Please state conditions under which only one of the two incentive constraint will bind, and show which one it is.
- (g) With the modification suggested in part (e), what is the set of wages that maximizes the expected profit for the investors when $A = 0$, $q_G = 1$, and $q_B = 0$?
- (h) Suppose the objective function under socialism was not the expected profit for the investors, but the total surplus overall, including the payoff to the manager. What would now be the set of optimal wage schedules (where, again, $b > 0$ and $c > 0$). Compare the answer to part (g) and explain.