UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Home exam: **ECON5200/9200 – Advanced Microeconomics**

Exam period: November 30 – December 3, 2015   **Grades are given: January 4, 2016**

Guidelines:
Submit your exam answer electronically to: submissions@econ.uio.no. Last day for submission is Thursday, December 3 at 15.00.

Written text should be in pdf format. Please remember to also submit *Declaration Form for Portfolio assessment/take home exam* which you will find on the course web page. This must be submitted as a separate document.

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 apply to our PhD-program, and would like to use this course as a part of the master's degree, must obtain the grade C or better. Students who would like to have the course approved as a part of our PhD-program, must obtain the grade B or better (according to "Supplementary rules regarding regulations for the PhD degree at SV). 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/kildebruk/ (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.sv.uio.no/english/studies/admin/exams/postponed-exam/index.html for further details.

Part 1.

- (20 points) Paper. Read "Maxmin Expected Utility with Non-unique Prior" by Gilboa and Schmeidler (1989) in the *Journal of Mathematical Economics* 18, pp.141-153 and answer the following questions.

    - (4 points) Explain in few words (max 5 lines) what type of preferences are characterized in the paper.

    - (6 points) In the first paragraph, the authors claim that expected utility type of preferences are not compatible with the ranking $AB \sim AR \succ BB \sim BR$ (based on the example suggested by Ellsberg). Prove this result.

    - (6 points) In MWG, expected utility representation of preferences are characterized in Prop 6.B.3. Which conditions need to be relaxed to accommodate the ranking $AB \sim AR \succ BB \sim BR$?

    - (6 points) Explain the difference between the independence axiom (see MWG Definition 6.B.4) and Certainty-Independence, proposed in the paper (max 5 lines).

- (20 points) Exercise. Anna and Barbara have preferences over consumption $c \in \mathbb{R}_+$ and leisure $(1 - \ell)$, where $\ell \in [0, 1]$ is labor time. The preferences are represented by:

$$U_A = (c_A)^{\alpha} (1 - \ell_A)^{1-\alpha} ; U_B = (c_B)^{\beta} (1 - \ell_B)^{1-\beta} ;$$

where $\alpha, \beta \in (0, 1)$.

    - (3 points) Compute Anna's Walrasian and Hicksian demand functions.

    - (3 points) Compute Anna's indirect utility function and verify Roy's identity.

Now assume that $\alpha = \frac{2}{3}$ and $\beta = \frac{1}{3}$. Assume that a firm produces output through labor with the following technology:

$$y \leq 27 (\ell_A + \ell_B).$$

Each individual owns her unit of time and half of the firm (no consumption good endowment).

    - (3 points) What properties does this technology satisfy among those in Ch.5 of MWG? Briefly motivate your answers.

    - (3 points) Determine the profit function of the firm.

    - (4 points) Compute the Walrasian equilibrium for this private ownership economy.

    - (4 points) Represent graphically the equilibrium (in 1 graph).

Part 2.

- (20 points) While we learned mechanism design from Ch 23 in MWG, consider also Example 27.1 in Osborne & Rubinstein.

    - (5 points) Formulate this second-price auction as a Bayesian game and show that this game has a Nash equilibrium where all players bid their valuations.

    - (5 points) Consider now the same situation, but with the difference that $v_i - \max_{j \in N \setminus \{i\}} a_j$ is replaced by $v_i - a_i$. This turns the game into a first-price auction. Formulate this as a Bayesian game and characterize a symmetric Nash equilibrium.

    - (5 points) Use Roger B. Myerson, "Optimal Auction Design" (*Mathematics of Operations Research* **6**, 1981, 58–73) and John G. Riley and William F. Samuelson "Optimal Auctions" (*American Economic Review* **71**, 1981, 381–392) to argue that the expected revenue for the auctioneer is the same for both auctions.

    - (5 points) Provide a general discussion of what assumptions this 'revenue equalization theorem' is based on.

Part 3.

- (20 points) Paper. Read "Information Aggregation, Rationality, and the Condorcet Jury Theorem" by Austin-Smith and Banks (1996) in the *American Political Science Review* 90(1), pp. 34-45 and answer the following questions.

    - (2 points) Define the elements that constitute the Bayesian Game for the basic model described at pp. 35-39.

    - (2 points) Define a Bayesian Nash Equilibrium for this game.

    - (6 points) Define a *sincere voting* strategy. Show that all individuals voting *sincerely* cannot be a Nash Equilibrium of the game.

    - (4 points) Derive analytically Eqs. (5), (6), and (7) at pag. 37 and discuss possible comparative statics.

    - (3 points) Consider the Example 1 at pag. 39. Let $N = \{1, ...11\}$, $q^a = q^b = 0.7$ and $\pi = 0.5$. Evaluate points (i), (ii), (iii), and (iv) of the example.

    - (3 points) Extend the basic model in at least one relevant dimension at your choice. Discuss implications in terms of equilibrium voting decisions.

- (20 points) Paper. Read "Equilibrium Unemployment as a Worker Discipline Device" by Shapiro and Stiglitz (1984) in the *American Economic Review* 74(3), pp. 433-444 and answer the following questions.

- (4 points) Derive the incentive compatibility constraint for worker, i.e., the *no-shirking condition*. Suppose that with a certain probability, $p < q$, the worker can be fired even if he does not shirk. How does the incentive compatibility constraint change?

- (3 points) Discuss why unemployment can be considered as a discipline device for workers.

- (5 points) Show that the equilibrium is not Pareto optimal.

- (8 points) Think about alternative incentive devices that, like unemployment, can discipline the workers to exert high effort. Write a principal-agent model and characterize the optimal contract under symmetric and asymmetric information.