

# Homework 19

## Due March 27, 2018

Homework must be on the instructor's desk at K9 by 15:10. Papers turned in from 15:11 till 15:40 will be accepted at a penalty of 10 points. Submissions at any other time or manner will be ignored. Any paper which does not resemble a work by a student of a world-class institution (not clean, illegible, unnamed, unstapled, unlabelled tasks, final results not in boxes etc.) will be penalized with up to 50 points at the discretion of the grader. Copying in homework will be penalized with a 0 in that assignment plus 0 in the previous submitted assignment. Students who give their homework away for others to copy from will be additionally penalized with 0s in the past 3 assignments.

1. John and Betty have to complete a homework assignment. John proposes: *"Betty will do all the work and then will give it to me to copy it so I can use my time in something more pleasant than doing homework"*. Which of the following seems about right to you?
  - A. Accepting this deal makes Betty a 'cool person' who helps others.
  - B. Accepting this deal makes Betty a 'victim' and a 'sucker' because John takes advantage of her by just letting her believe her that she is cool for doing it, while Betty effectively decreases the value of her degree. This is because people like John who tried less than Betty, often slip through the system, receive the same degree like Betty and later on may even get a better job than her because they will hold the same degree and they additionally know how to manipulate people like Betty to work for them for free.
  - C. Accepting this deal makes Betty a 'bad person' because she deprives John from the incentive to do the work he is supposed to in order to prepare for the course just because she wants to hear him say: *"Betty, you are so cool for hookin' me up with the homework!"*. Then, if the professor puts in the exam tasks that can be answered only from students who really solved the homework by themselves, John will have no idea how to solve those tasks neither in the exam, nor in the commission exam, nor in the UoL. Then, John will be in deep trouble because of Betty.
  - D. Both (B) and (C) can be correct.
  
2. Consider the Baron & Myerson (1982) framework, where the regulator's problem is to provide sufficient incentives by choosing a price – subsidy combination, so that the monopolist would produce at maximum efficiency. The demand curve faced by the monopolist is  $q = A - bp$ . The regulator knows that the industry is characterized by constant returns to scale and the unit cost of the monopolist can be  $\theta_L$  with probability  $\varphi$ ,  $\theta_M$  with probability  $\pi$  or each  $\theta_H$  with probability  $(1 - \varphi - \pi)$ . Assume that  $\theta_L < \theta_M < \theta_H$ .
  - (a) Explain what would be the first-best set of menus. [10p]
  - (b) Is the first-best set of menus compatible with a separating equilibrium? [5p]
  - (c) If  $\pi = 0$ , but  $\varphi \neq 0$ , what would be the incentive-compatible set of menus? [10p]
  - (d) Without trying to derive a set of menus, explain what additional constraints a regulator would need to consider if  $\pi \neq 0$  and  $\varphi \neq 0$ . [10p]
  - (e) Without any calculations, explain what additional constraints a regulator would need to consider if this model was dynamic. [10p]
  - (f) Assume  $\pi = 0$ ,  $\varphi \neq 0$ ,  $\theta_L = 0$ . Explain whether a firm would prefer a bigger or a smaller gap between  $\theta_H$  and  $\theta_L$ . [15p]
  
3. A profit maximizing firm has the chance to research the cure for the common cold (CCC). If it spends  $Z > 1$  on R&D, then it has probability  $p(Z) = 1 - 1/Z$  of discovering the CCC (and zero probability otherwise). Assume that the firm has no other costs besides research costs and no other revenues

other than those from selling the CCC if it discovers it. The present value of revenue from the CCC once discovered is  $\Pi$ . Units for research costs and CCC profits are millions of pounds.

- (a) Assume that  $\Pi$  is sufficiently high that the firm finds it profitable to do research. How much will it spend on research as a function of  $\Pi$ ? [10p]
- (b) What is the expected present value of profits in terms of  $\Pi$  if the firm optimally chooses  $Z$ ? What would happen if  $\Pi < 4$ ? Explain. [10p]
- (c) Assuming no discounting (the present value of profits is just the sum of all future profits) and an annual profit of 0.15 from monopoly exploitation of CCC, what is the minimum amount of years that the firm must run as a monopoly to make it worthwhile to spend  $Z > 0$ ? [15p]

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*Estimated completion time: 100 min*

*Difficulty level (normalized to UoL standards): 2. 5/5 3. 4/5*