Make-up Exam

Economics 201B — First Half

Note: There is *no* point to your taking this make-up examination if you received a score of 50 or better on the first exam. A score of 50 or more on the first exam means you already have a grade of A or better for the first-half of Economics 201B.

INSTRUCTIONS. This is a take-home examination. You may consult whatever material you wish. You may *not*, however, discuss the exam with anybody or otherwise communicate with any person about it. The only two exceptions to this last rule are Ben Hermalin and Leonidas Enrique de la Rosa (Kike). You may *not* email or otherwise distribute this copy of the exam to anyone.

You have 24 hours from the time that you are emailed this exam to turn in your answers to it. Acceptable means of turning in your answers are (i) as a Word attachment to an email to Ben Hermalin (hermalin@haas.berkeley.edu); (ii) as a *standard* LaTeX attachment to an email to Ben Hermalin (hermalin@haas.berkeley.edu); (iii) as a PDF file attachment to an email to Ben Hermalin (hermalin@haas.berkeley.edu); or (iv) in blue books turned into Ben Hermalin (F675 Haas School). Whatever method you choose, please make sure your name is on any materials turned in (or in any file submitted electronically).

Answer all *five* (5) questions. Each question counts equally. Neither the GSI nor I are trained in reading cuneiform, linear B, or hieroglyphics, so please write neatly.

QUESTIONS

1. A theater faces demand $D(p) = 1000 - 20p$ for seats to a performance, where p is the price of a ticket. The marginal cost of providing a seat is so negligible that you may consider it to be zero.

   (a) What is the profit-maximizing price for the theater to charge?

   (b) What is the deadweight loss if the theater charges the profit-maximizing price?

2. A theater has 100 seats in the orchestra section (near the stage) and 100 seats in balcony section (far from the stage). It faces two types of customers for a particular concert. Assume there are N_1 consumers of type 1 and N_2 consumers of type 2. The theater cannot distinguish between the two types by observation or any other attribute that would permit third-degree price discrimination. Assume a type-1 consumer values a seat in

the orchestra section at r_1 ("r" for oRchestra) and a seat in the balcony at b_1. Assume a type-2 values both kinds of seats equally at ν_2. Both types of consumer have a quasi-linear utility of the form $\delta v + y$, where $\delta \in \{0, 1\}$ denotes whether a seat is purchased ($\delta = 1$) or not ($\delta = 0$), v is the value for the kind of seat purchased, and y is consumption of the numeraire good. Assume that $r_1 > b_1 > \nu_2 > 0$. Finally, presume that the marginal cost of providing a seat is so negligible that you may consider it to be zero.

(a) Assume that $N_1 = N_2 = 100$ and $2\nu_2 > b_1$. What are the profit-maximizing prices for the theater to charge for orchestra seats and for balcony seats?

(b) Assume that $N_1 = N_2 = 100$ but $2\nu_2 < b_1$. Now what are the profit-maximizing prices?

(c) Assume that $N_1 > N_2 = 100$. Return to the assumption that $2\nu_2 > b_1$. As a function of N_1, what are the profit-maximizing prices to charge?

(d) A "fair-seating" law is passed such that all seats in a theater must be offered at the same price (*i.e.,* the theater can no longer charge different prices for orchestra seats as opposed to balcony seats). Assume, as in (a), that $N_1 = N_2 = 100$ and $2\nu_2 > b_1$. Derive conditions under which such a fair-seating law is welfare *reducing*.

3. A benevolent social planner is deciding how much park land to develop for the citizens of a given region. Let x denote the acres of such park land. There are N citizens in the relevant society. Each citizen, n, has a quasi-linear utility function of the form $\theta_n \log(x) + y$, where $\theta_n \in \Theta \subset \mathbb{R}_+$, $\log(\cdot)$ denotes the natural logarithm, and y is the amount of the numeraire good. The cost of x acres of park land is $1000x$. This cost will be evenly divided among the citizens; that is, citizen n must pay $1000x/N$ in taxes to fund the provision of x acres of park land. The social planner wishes to maximize net social welfare from park land; that is, she wishes to maximize

$$\underbrace{\sum_{n=1}^{N} \theta_n \log(x)}_{\text{total benefit}} - \underbrace{1000x}_{\text{total cost}} \,. \tag{1}$$

Each citizen's θ is his or her private information. Design a *dominant-strategy* mechanism that allows the social planner to maximize (1) for all realizations of $(\theta_1, \ldots, \theta_N) \in \Theta^N$.

4. Consider a hidden-information principal-agent model of the sort examined in "Hidden-Information Agency." Assume the agent's utility is

$$s - (2 - \theta)x^2/2 \,,$$

where s is a transfer from principal to agent, $\theta \in [0, 1]$ is the agent's type (his private information), and x is production of a valuable good. The principal's utility is $x - s$. The timing of the game is that the agent learns his type, then the principal offers a contract to the agent on a take-it-or-leave-it basis. If the agent leaves it (*i.e.,* rejects the contract), then the game ends and the agent gets a payoff of 0. If the agent takes it (*i.e.,* accepts the contract), then the agent produces the valuable good and is compensated according to the contract. Although the principal does not know θ, she does know that it is drawn according to the uniform distribution from the interval $[0, 1]$. What is the optimal mechanism for the principal to propose (*i.e.,* the mechanism that maximizes her expected profit)?

5. Consider a hidden-action principal-agent model of the sort examined in "Hidden Action and Incentives." Assume the agent's utility is

$$\log(s + 1) - a\,,$$

where $\log(\cdot)$ is the natural logarithm, s is a transfer from principal to agent, and $a \in \{0, 1\}$ is the agent's action. There is a verifiable signal, $x \in \{1, 2\}$. The probabilities of realizing different signals x given actions a are given by

$$\text{Prob}\{x = 2|a\} = \begin{cases} 3/4 \text{ if } a = 1 \\ 1/4 \text{ if } a = 0 \end{cases} .$$

Of course, $\text{Prob}\{x = 1|a\} = 1 - \text{Prob}\{x = 2|a\}$. The principal offers the agent a contract on a take-it-or-leave-it basis and the agent's reservation utility is 0. What is the optimal contract for the principal to offer if she wishes to induce the agent to choose $a = 1$ while keeping her expected wage bill as small as possible?