

Midterm Examination 2

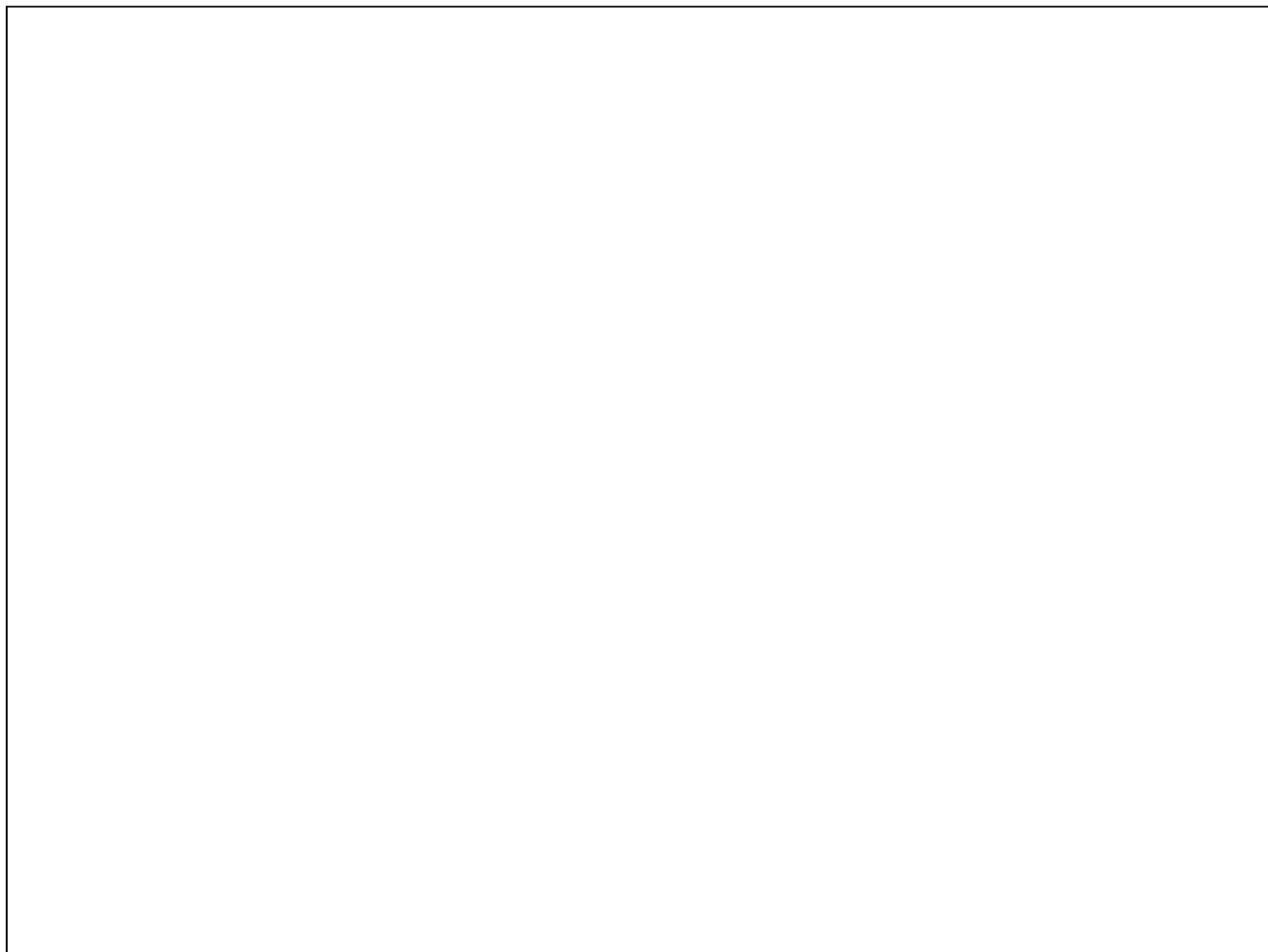
Instructions: Answer the problems in the spaces provided (but you do not have to fill the space). You may use the backs of the sheets for scratch paper. Think before you write. Your grade will be based on your reasoning, not on your formal calculations. Do not spend too much time on any one part. If you have to leave the room for any reason, please give the instructor your examination on the way out. You will have 80 minutes to complete the exam. I suggest that you do not exceed the recommended times for each question until you have answered all questions. Then, you can use the extra time to improve your answers. If you finish before 6:10 pm, you may leave, but be extremely quiet!

Problem 1. [15 minutes] The production function for sugar is given by

$$q(k, \ell) = \begin{cases} k + 2\ell & \text{for } k \geq \ell \\ 2k + \ell & \text{for } k < \ell \end{cases}.$$

Let r and w denote the prices of k and ℓ .

- a) [? minutes] Draw a graph that illustrates the production isoquant for $q = 20$. Label carefully. Then add isoquant for $q = 10$ and $q = 30$. Make sure the shape of the isoquants is correct, but the picture doesn't have to be exact.



- b) [*? minutes*] Find the conditional derived-demand correspondences for k and ℓ given output q . [*Hint: Given output q , what is derived demand for k and ℓ when $w > 2r$?*]

Problem 2. [*? minutes, total*] **Roberto** Benigni and **Dolly** Parton like to discuss books, but they cannot remember whether they were supposed to discuss *I'm Tricking the Italian People* [*Estoy BURLANDO a la Gente Italiana*] by **Silvio** Berlusconi or *I'm Tricking the American People* [*Estoy BURLANDO a la Gente Estadounidense*] by **George W** Bush. But because Italian cell phones are not working today, **Roberto** cannot call **Dolly**, and both must decide what to read independently and simultaneously.

- If **Roberto** and **Dolly** both read **Silvio's** book, then **Roberto** has a payoff of 5 and **Dolly** has a payoff of 8 (they enjoy **Silvio's** jokes about Germans).
- If the both read **George's** book, then **Roberto** has a payoff of 3 and **Dolly** has a payoff of 2 (they worry that **George** will destroy the world).
- If **Roberto** reads **Silvio's** book and **Dolly** reads **George's** book, then both get 10 (they decide to move to Shanghai and get rich).
- If **Roberto** reads **George's** book and **Dolly** reads **Silvio's** book, then both get 6 (they decide to move to Beijing and get rich).

- a) [*? minutes*] Describe the strategy spaces and information sets of the players in this normal-form game.

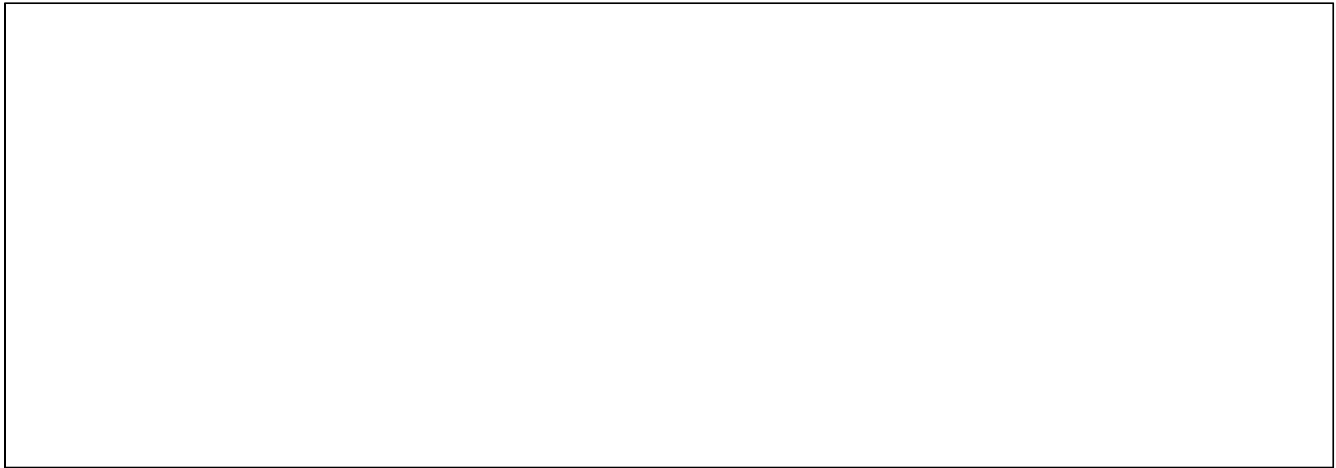
- b) [*? minutes*] Present the payoff matrix for the game. Carefully specify the players, their strategies and their payoffs.

c) [*? minutes*] Find all the pure-strategy Nash equilibria for this game.

d) [*10 minutes*] Find all the mixed-strategy Nash equilibria.

Now suppose that **Dolly** sends an email to **Roberto** with her choice of books. **Roberto** reads the email and learns **Dolly**'s choice before he makes his own choice.

e) [*? minutes*] What are the players' strategy spaces for the new game in extensive form?



f) [*? minutes*] Draw the complete game tree. Label it carefully with the players, their actions, their information sets and their payoffs.



- g) [5 minutes] In your game tree above, put a checkmark (\checkmark) next to the start of each subgame. Then, in the answer box below, derive a subgame-perfect equilibrium. Is it unique? Show your work.

- h) [*? minutes*] How would the payoffs change if **Roberto** and **Dolly** could agree on their choice of books in advance? Do the players have a conflict of interest?

- i) [*Extra credit*] **Dolly** Parton is planning to have surgery in the near future (this is true). What is the purpose of this surgery? Will Roberto Benigni like her more after the surgery? Explain.