

### ECON 521, Discussion Section 8

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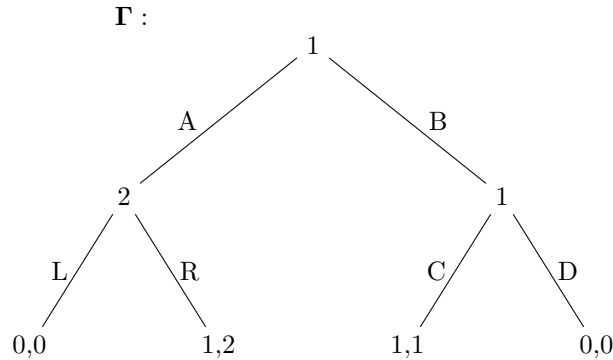
1. Consider a game similar to Cournot except one firm first decides how much to spend on advertising. That is, Firm 1 first chooses a level of advertising  $a$ . Then, Firm 1 and 2 simultaneously choose how much to produce. The cost of advertising at level  $a$  is  $\frac{2a^3}{81}$  and the market price is  $p = a - q_1 - q_2$ . Assume the good costs nothing to produce. Find the SPE.
2. Consider a two-period game in which one agent is selling up to four units of a good. The good has no cost to the seller (or you can reason that he has already acquired it), but does have value to buyers. There are two types of buyers, high-type and low-type. Their value from owning the good in each period is as follows:

		1	2
Valuations :	H	1200	500
	L	500	200

That is, if a high-type buyer purchases the good in period 1, it provides him total utility of 1700, and he doesn't have to repurchase it in period 2. The seller may charge a different price for the good in each period. Suppose there are two high-type buyers and two low-type buyers. The seller wants to maximize profits, and can vary the prices across the periods but not directly discriminate between the two types of clients.

- (a) How many subgames are there in this game?
- (b) What is the maximum profit the seller could make in a pricing scheme in which he sold to everybody in the first period?
- (c) What is the maximum profit the seller could make in a pricing scheme in which he sold to everybody in the second period?
- (d) What is the maximum profit the seller could make in a pricing scheme in which he sold to just the high-types in the first period and didn't sell to the low-types?
- (e) What is the maximum profit the seller could make in a pricing scheme in which he sold to the high-types in the first period and the low-types in the second period?
- (f) Are there any other possible pricing schemes? Give an intuitive argument to rule them out.
- (g) Is the maximum profit you have found so far consistent with SPE? If not, then what is the SPE?

3. Consider the following game (noting that P1 chooses between  $C$  and  $D$  – that isn't a typo):



- Why does backwards induction not have a solution in this game?
  - Show the full normal/strategic form of this game.
  - Show the reduced normal form.
  - Find all SPE.
  - Using the normal form (not the reduced normal form, though it doesn't particularly matter) find an order of Iterated Weak Dominance that eliminates an SPE. Then find an order in which both SPE survive.
4. Consider a variation of the burning money game in which P1 has an option to burn money. Then, after observing P1's choice, P2 has the option to burn money. Then the two players play BoS - see the full game below in which D/d stands for *don't burn*, B/b stands for *burn*, F/f stands for *football* and C/c stands for *concert*. Construct the reduced normal form of the game and find the set of outcomes that survive iterated deletion of weakly dominated actions. Compare it with the outcome of the burning money game from the lecture.

*Hint: Try to go straight to the reduced normal form skipping the normal form here. The problem with the non-reduced normal form is that P1 has  $2^5 = 32$  possible strategies, and P2 has  $2^6 = 64$  possible strategies, so the full normal form is a  $32 \times 64$  matrix. The reduced normal form is still  $8 \times 16$ , which still sucks, but is at least doable.*

