

Strategic Behavior

Fall, 2022.

Problem Set 3

Not due anytime. Will be reviewed in class on Thursday Sep 29.

Do problem 1.11, 1.12

[Hint for problem 1.11: players will randomize between strategies that survive iterated elimination of strictly dominated strategies]

1. Consider the Stackelberg model of duopoly discussed in Section 2.1.B. Suppose that instead of setting quantity of output, the firms determined their prices sequentially. First, firm 1 announces its price (which is irreversible). This is observed by firm 2. Next, firm 2 announces its price. Once both prices are announced the payoffs are just as in the Bertrand duopoly game with homogenous good discussed in class (or problem 1.7 in the textbook included in the previous problem set); the firm charging the lower price sells the entire market demand at that price while the other firm gets zero; if both charge identical prices, they split the market equally. Determine the backward induction outcome.

[Hint: Not much algebra needed here; just argue logically]

2. Companies X and Y are engaging in an advertising war to win a government contract. The company that spends the most on advertising will win the contract. Winning the contract will yield a profit of 1 million dollar to the winner minus the amount spent on advertising. The loser will earn a loss equal to the amount spent on advertising. If they both spend equally, they each win with probability $\frac{1}{2}$ so that their *expected* payoff in that case is half a million dollars minus the amount spent on advertising. Suppose that Company X first commits its advertising expenditure (it is irreversible). This is observed by Company Y which then determines its advertising expenditure. Assume that expenditure can only be denominated in whole dollars. Determine a backward induction solution (or solutions) to this game. Is there a first mover advantage?

[Hint: Logical argument sufficient.]