

MIDTERM 1

Economics 476

October 24-26, 2017

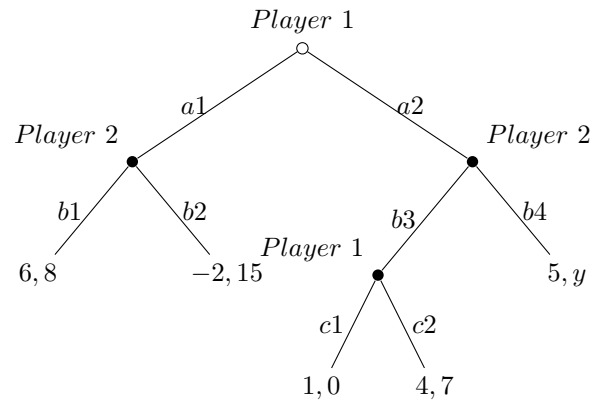
Total points: 100

1. [15 points] Consider the following game:

		RED CAR					
		<i>Slow lane</i>		<i>Middle lane</i>		<i>Fast lane</i>	
BLACK CAR	<i>Slow lane</i>	3	5	4	8	2	6
	<i>Middle lane</i>	1	3	x	y	6	5
	<i>Fast lane</i>	8	1	7	6	3	3

- (a) Let $x = 3$ and $y = 6$. Does either player have a dominant strategy?
- (b) Now let $x = 2$ and $y = 4$. Are there any pure strategy Nash equilibria? If so, what are they (it)?
- (c) Now let $x = 10$ and y is unknown where $\{Middle\ lane, Middle\ lane\}$ is the only pure strategy Nash equilibrium. Which values of y lead to this result?

2. [10 points] Consider the following game:



- (a) How many subgames does this game have?
- (b) What is the subgame perfect Nash equilibrium if $y = 6$? What are the payoffs?

3. [25 points] Consider a 2-period sequential moves game with 2 firms: Nintendo (leader) and Microsoft (follower). Nintendo moves in the first period and Microsoft moves in the second period. Assume that market inverse demand is given by $P = a - bQ$ where $Q = q_{Nintendo} + q_{Microsoft}$ and the cost of production for Nintendo and Microsoft is $c_{Nintendo}q_{Nintendo}$ and $c_{Microsoft}q_{Microsoft}$, respectively. Also assume that each firm competes by choosing quantity (Stackelberg).
- (a) What is the profit function for Microsoft?
 - (b) Solve for the best-response function for Microsoft: $R^{Microsoft}(q_{Nintendo})$.
 - (c) What is the profit function for Nintendo?
 - (d) Solve for the optimal output of each firm (i.e. $q_{Nintendo}^*$ and $q_{Microsoft}^*$) and the market clearing price, P^* .
 - (e) Now let $a = 120$, $b = 1$, $c_{Nintendo} = 8$, and $c_{Microsoft} = 4$. What is the optimal output for each firm and the market clearing price?

4. [25 points] Consider a one-period game with 2 firms: the Hogle Zoo (HZ) and the Living Planet Aquarium (LPA). The owners of each firm decided to have a friendly competition for charity: both firms will donate all profits to the World Wildlife Fund on Halloween. The Hogle Zoo faces a demand curve of $q_{HZ} = 900 - 6p_{HZ} + 4p_{LPA}$ and demand for the Living Planet Aquarium is $q_{LPA} = 900 + 4p_{HZ} - 6p_{LPA}$. Suppose that all costs for each firm are being covered by a wealthy donor for this special 1-day event (i.e. there are no costs). Assume that each firm competes by choosing price on their differentiated good (Bertrand).
- (a) What are the profit functions for the Hogle Zoo and the Living Planet Aquarium?
 - (b) Solve for the best-response functions for both the Hogle Zoo and the Living Planet Aquarium: $R^{HZ}(p_{LPA})$ and $R^{LPA}(p_{HZ})$.
 - (c) Solve for the optimal price for each firm: p_{HZ}^* and p_{LPA}^* .
 - (d) How much money is donated to the World Wildlife Fund (i.e. $\pi_{HZ}^* + \pi_{LPA}^*$)?

5. [25 points] Consider a monopolist who is considering selling a new product. Inverse demand is estimated at $P = 338 - 7Q$. Total cost is estimated at $3000 + 2Q$.
- (a) What is the monopolist's profit function?
 - (b) Solve for the monopoly output and price: Q^M and P^M .
 - (c) Does the monopolist enter the market?
 - (d) Assume the monopolist enters the market. Calculate producer surplus.
 - (e) Solve for consumer surplus.
 - (f) Assume the monopolist overestimated fixed costs, such that the new value for fixed costs is 2500 instead of 3000. Would producer and/or consumer surplus change? If so, would they increase or decrease?