

Problem Set 1

Exercise 1. Consider the game represented below.

	D	E	F	G
A	3,3	1,0	0,2	2,2
B	3,3	0,0	2,2	0,2
C	4,0	2,2	3,1	3,1

- Find all weakly and strictly dominant strategy.
- Find the rationalizable strategies.
- Find the pure-strategy Nash Equilibrium.

Exercise 2. Consider a variant of Hotelling-Downs model in which the candidates, as well as caring about winning per se, also care about the winner's position (like the voters). There are two candidates $i = 1, 2$. Each candidate i has a favorite position p_i and symmetric and single-peaked policy preference. Her private benefit for holding office is $b > 0$. Candidate i 's payoff when candidate j wins with policy x_j is $u_i(j, x_j) = f(|x_j - p_i|) + b\mathbb{I}\{j = i\}$, where f is strictly decreasing and continuous and $\mathbb{I}\{j = i\} = 1$ if $j = i$, $\mathbb{I}\{j = i\} = 0$ if $j \neq i$. The distribution of voters' preferences is continuous, and each voter's preference is single-peaked and symmetric. If the two candidates announce the same policy, each of them wins with probability $1/2$. Let the median voter's optimal policy be m , and assume that $p_1 < m < p_2$. Find the set of pure-strategy Nash equilibria.

Exercise 3. Consider a Cournot's game when there are two firms, the inverse demand function is given by

$$P(Q) = \begin{cases} \alpha - Q & \text{if } \alpha \geq Q \\ 0 & \text{if } \alpha < Q, \end{cases}$$

the cost function of each firm i is $C_i(q_i) = c_i q_i$, where $c_1 > c_2$ and $c_1 < \alpha$.

- Find the Nash Equilibrium.
- Which firm produces more output in an equilibrium?
- What is the effect of technical change that lowers firm 2's unit cost c_2 (while not affecting firm 1's unit cost c_1) on the firms' equilibrium outputs, the total output, and the price?