
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
Algorithmic Game Theory 2021-22: First Class Test

Date of Examination: 28th August 2021

Duration: 20 minutes (for writing answers) + 5 minutes (for taking photos, concatenating, and uploading to moodle)

Subject: CS60025 Algorithmic Game Theory

The last two digits of your roll number from right be d_2 and d_1 respectively. Let us define $d = 10 * d_2 + d_1$.

There are two farms, namely A and B, who produce the same goods. If farm A (respectively B) produces q_A (respectively q_B) quantity of goods, the total goods q available in the market is $q_A + q_B$. The price p per unit is given by the following formula.

$$p(q) = \begin{cases} 140 - q & \text{if } q < 140 \\ 0 & \text{otherwise} \end{cases}$$

The cost of production is d per unit of goods for both the farms. Hence, the profit for farm A and B are $(q_A * p(q) - d * q_A)$ and $(q_B * p(q) - d * q_B)$ respectively. Each farm needs to independently decide how much quantity (which are non-negative real numbers) of goods to produce.

1. Model the above situation as a two player normal form game.

[2 Marks]

2. Compute a PSNE for this game.

[6 Marks]

3. Compute a strategy profile where both farms receive higher utility than your computed PSNE.

[2 Marks]