Strategic Behavior
Fall, 2022.
Problem Set 2.
Due: Thursday, September 15, In class

Textbook: Solve problems 1.3, 1.4, 1.7

Also work out the following problem:

1. Consider the tragedy of the commons with n identical farmers discussed in Section 1.2.D. Suppose that $n = 2$ and that

$$v(G) = \overline{G} - G$$

where $\overline{G}$ is the maximum number of goats that can be grazed on the green ($G_{\max}$ in the textbook) and G is the total number of goats. Assume $\overline{G} > c$ where c is the cost of purchasing a goat. Derive the number of goats on the commons in the Nash equilibrium & compare it to the joint profit maximizing (cooperative) solution.

[Hint for problem 1.4 in textbook: The profit π_i of each firm i depends only on its output q_i and the total output of all other $(n-1)$ firms (that can be denoted by Q_{-i}):

$$\pi_i = [a - (q_i + Q_{-i})]q_i - cq_i$$

Find the best response or reaction of firm i to any Q_{-i} by differentiating π_i with respect to q_i and setting it equal to zero. Next, as all firms are symmetric you can guess that in Nash Equilibrium they will produce identical quantity, say q^*. So in the equation for the best response or reaction of firm i, you can set $q_i = q^*, Q_{-i} = (n-1)q^*$. Now, solve for q^*.]