University of California, Davis -- Department of Economics

ECN/ARE **200C** : **MICRO THEORY**

**SPRING 2024** Professor Giacomo Bonanno

# HOMEWORK 4 (for due date see the web page)

A homogeneous-product industry consists of two firms: Firm 1 has two production plants, whereas Firm 1 has only one; there are no capacity constraints for either firm. The inverse demand function for the product is $P = 120 - Q$ (where $Q$ is industry output). Each production plant has the same cost function, given by $C(q) = 12q$. Consider the following two-stage game: in Stage 1 Firm 1 decided whether to set up the firm as a single unit or to "divisionalize", that is, set up the two plants as independent entities; in the latter case the manager of each plant is instructed to maximize the profit of her own plant (or division) and the profit of Firm 1 is given by the sum of the profits of its two divisions. In Stage 2, the Stage-1 decision of Firm 1 becomes public knowledge and there is simultaneous Cournot competition among the relevant entities (Firm 1 and Firm 2, if Firm 1 is centralized, or Plant 1 of Firm 1, Plant 2 of Firm 1 and Firm 2, if Firm 1 is divisionalized).

**(a)** Draw the extensive-form of this two-stage game for the case where there are only two possible output levels. No need to write the payoffs.

**(b)** Find the subgame-perfect equilibrium of the game for the general case where output levels can be any non-negative numbers.