Problem Set 3 – Fundamental of Economics, Data Science for Management, University of Catania.

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(Problem sets should be submitted individually – one for each student – in class on Monday, October 28. Please show not only the solutions but also the relevant steps to obtain the results. Thanks and have fun!)

1. Consider two firms (A and B) with following production function: $Y=L^{1/2} K^{1/2}$, with the prices of factors of production that are respectively w=1 r=1 for firm A and w=2 r=1 for firm B. a) Find the cost total function as well the marginal and the average cost for the two firms. b) Assuming an inverse demand function p=100-2y and competition a la Cournot, find the equilibrium (y_A and y_B), the price, the profit of each firm and total quantity in equillibrium. c) Find another allocation (y_A and y_B) in which the profit of at least one firm (or both firms) is higher that in equilibrium and show that this is not an equilibrium. Explain why. d) Assume that both firms compete a la Bertrand. Solve point b) in Bertrand competition.
2. Recall that in equilibrium, no firm has an incentive to deviate. Show that when the number of firms n is such that n>2 and firms are all identical, the equilibrium in Betrand competition is the one in which at least two firms set price equal to their marginal cost.
3. Consider two identical firms with marginal costs equal to c and assume that prices can be only integers (c-1, c, c+1, c+2, c+3, …). Firms compete a la Betrand. Is (p_A=c , p_B= c) an equilibrium? Is there another equilibrium?