

Consider the following Cournot (quantity choice) simultaneous games between two firms. Find the Nash equilibrium quantity for each firm as well as the market price and each firm's profit.

1. The firm's face demand function  $P(Q) = 995 - 10Q$ . The total cost for firm 1 is  $TC_1(q_1) = 5q_1^2 - 5q_1 + 20$  and for firm 2 is  $TC_2(q_2) = 5q_2^2 - 5q_2 + 50$ .
2. The firm's face demand function  $P(Q) = 4802 - 10Q$ . The total cost for firm 1 is  $TC_1(q_1) = 5q_1^2 + 2q_1 + 30$  and for firm 2 is  $TC_2(q_2) = 5q_2^2 + 2q_2 + 30$ .
3. The firm's face demand function  $P(Q) = 891 - 3Q$ . The total cost for firm 1 is  $TC_1(q_1) = 6q_1 + 40$  and for firm 2 is  $TC_2(q_2) = 21q_2 + 40$ .
4. The firm's face demand function  $P(Q) = 700 - 2Q$ . The total cost for firm 1 is  $TC_1(q_1) = 4q_1$  and for firm 2 is  $TC_2(q_2) = 4q_2$ .
5. The firm's face demand function  $P(Q) = 153 - 3Q$ . The total cost for firm 1 is  $TC_1(q_1) = 9q_1$  and for firm 2 is  $TC_2(q_2) = 9q_2$ .
6. The firm's face demand function  $P(Q) = 234 - 8Q$ . The total cost for firm 1 is  $TC_1(q_1) = 2q_1 + 162$  and for firm 2 is  $TC_2(q_2) = 10q_2 + 10$ .

The answers are:

1.  $q_1 = 25, q_2 = 25, price = 495, \Pi_1 = 9355, \Pi_2 = 9325$
2.  $q_1 = 120, q_2 = 120, price = 2402, \Pi_1 = 215970, \Pi_2 = 215970$
3.  $q_1 = 100, q_2 = 95, price = 306, \Pi_1 = 29960, \Pi_2 = 27035$
4.  $q_1 = 116, q_2 = 116, price = 236, \Pi_1 = 26912, \Pi_2 = 26912$
5.  $q_1 = 16, q_2 = 16, price = 57, \Pi_1 = 768, \Pi_2 = 768$
6.  $q_1 = 10, q_2 = 9, price = 82, \Pi_1 = 638, \Pi_2 = 638$