

## Microeconomics II

### Homework 8

#### Question 1.

Suppose that a honey farm is located next to an apple orchard and each acts as a competitive firm. Let the amount of apples produced be measured by  $A$  and the amount of honey produced be measured by  $H$ . The cost functions of the two firms are  $c_H(H) = H^2/100$  and  $c_A(A) = A^2/100 - H$ . The price of honey is \$2 and the price of apples is \$3.

- If the firms each operate independently, what will the equilibrium amounts of honey and apples produced be?
- Suppose that the honey and apple firms merged. What would be the profit-maximizing output of honey for the combined firm? What would be the profit-maximizing amount of apples?

#### Question 2.

A clothing store and a jewelry store are located side by side in a small shopping mall. The number of customers who come to the shopping mall intending to shop at either store depends on the amount of money that the store spends on advertising per day. Each store also attracts some customers who came to shop at the neighboring store. If the clothing store spends  $x_C$  per day on advertising, and the jeweler spends  $x_J$  on advertising per day, then the total profits per day of the clothing store are  $\Pi_C(x_C, x_J) = (60 + x_J)x_C - 2x_C^2$ , and the total profits per day of the jewelry store are  $\Pi_J(x_C, x_J) = (105 + x_C)x_J - 2x_J^2$ . (In each case, these are profits net of all costs, including advertising.)

- If each store believes that the other store's amount of advertising is independent of its own advertising expenditure, find the equilibrium amount of advertising for each store by solving two equations in two unknowns. Find also corresponding profits of both stores.
- Suppose that the owners of both stores know the profit functions of each other, and suppose they choose their advertising level taking into account each others reaction . What would be optimal  $x_J$  and  $x_C$  and the corresponding profits?
- Suppose that the clothing store and the jewelry store have the same profit functions as before but are owned by a single firm that chooses the amounts of advertising so as to maximize the sum of the two stores' profits. Without calculating actual profits, can you determine whether total profits will be higher, lower, or the same as total profits would be when they made their decisions independently?