Vertical Integration Practice Question

(50 points) Suppose the production of 1 bottle of green-tea drink requires 1 portion of sugar. The marginal cost of 1 portion of sugar is 4. The green-tea drink firm's own marginal cost of producing 1 bottle of green-tea drink is 8. The demand for green-tea drinks is given by:

$$P(Q) = 600 - Q$$

Suppose the sugar industry is operated by a monopoly and the green-tea drink industry is operated by a monopoly.

(a) (5 points) Let the price per 1 portion of sugar be "P_S", find the derived demand for sugar.

(b) (5 points) According to the derived demand in part a), what would be the price per one portion of sugar charged by the sugar monopoly? What would be the quantity of sugar sold in the market? Find the profit earned by the sugar monopoly.

(c) (5 points) What would be the price of each green-tea drink? What would be the quantity of green-tea drink sold in the market? Find the profit earned by the green-tea firm.

(d) (5 points) Calculate the deadweight loss from the above double-marginalization practice.

(e) (12 points) Suppose there are now 3 identical green-tea firms playing a non-cooperative Cournot game. Each firm's own marginal cost of producing 1 bottle of green-tea drink is still 8. The market demand is still $P(Q) = 600 - Q$. The sugar industry is still operated by the same sugar monopoly. Find the derived demand for sugar faced by the sugar monopoly.

(f) (5 points) From the derived demand in part (e), what should be the price and quantity set by the sugar monopoly? Find the profit earned by the sugar monopoly.

(g) (8 points) Following from part (e) and (f), calculate the market price of green-tea drinks, the quantity of green-tea drinks produced by each of the green-tea firms. Calculate the profit earned by each of the green-tea firms.

(f) (5 points) Compare the profit that the sugar monopoly receives in part (b) and part (f). Under which situation does the sugar monopoly make more profit? Explain why.