A Cournot widget oligopoly consisting of 9 identical firms asks the Department of Justice for permission to form a production joint venture in order to make their industry more efficient. Currently, each firm can produce unfinished widgets at a constant average and marginal cost of 20. Each firm’s finishing and packaging costs are 10 per unit. The proposed joint venture will require an investment of $F$ in fixed costs, but will produce unfinished widgets at a marginal cost of 10 per unit. The (inverse) market demand curve for widgets is given by $P = 120 - W$, where $W$ is the quantity of widgets. There are two proposals for organizing the joint venture:

Plan A: The production facility will be established as an independent entity, jointly owned by the original firms in the industry, who will remain Cournot oligopolists in the finished widget market. This production monopolist would be free to set any price it wished for unfinished widgets.

Plan B: The production facility will be established as a nonprofit cooperative. Each producer of finished widgets pays a fee of $F/9$ for the option of purchasing unfinished widgets at 10 per unit. Again, the firms will remain Cournot oligopolists in the finished widget market.

Due to patent protection, no new firms will enter the industry under either plan.

1. Describe equilibrium in the market for finished widgets under the status quo. That is, what are the equilibrium values of price, quantity, and profits?

2. Explain why the market price of unfinished widgets would be 20 under Plan A.

3. Describe equilibrium in the market for finished widgets under Plan A. That is, what would be the equilibrium values of price, quantity, and profits?

4. Given that the industry anticipates that Plan A will increase (or at least not decrease) profits, what is the largest $F$ can be? Explain your answer.

5. If you were interested in maximizing total surplus, what would be the largest value of $F$ for which you would advise the DOJ to approve Plan A. Explain your answer.

6. Describe equilibrium in the market for finished widgets under Plan B. That is, what would be the equilibrium values of price, quantity, and profits?

7. Demonstrate why someone interested in maximizing total surplus would always prefer Plan B to Plan A.

8. What is the largest value of $F$ for which the industry would voluntarily agree to replace the status quo with Plan B?