The Xerxes Company is composed of a marketing division and a production division. The marketing division packages and distributes a plastic item made by the production division. The demand curve for the finished product sold by the marketing division is

$$P\_{0}=200-3Q\_{0}$$

Where $P\_{0}$ is the price sold (in dollars per pound) of the finished product and $Q\_{0}$ is the quantity sold (in thousands of pounds). Excluding the production cost of the basic plastic item, the marketing division’s total cost function is

 $TC\_{0}$ = 100 + $15Q\_{0}$

Where $TC\_{0}$ is the marketing division’s total cost (in thousands of dollars). The productions division’s total cost function is

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 $TC\_{1}$ = 5 + $3Q\_{1}$ + $0.4\_{1}$

Where $TC\_{1}$ is total production cost (in thousands of dollars) and $Q\_{1}$ is the total quantity produced of the basic plastic item (in thousands of pounds). There is a perfectly competitive market for the basic plastic item, the price being $20 per pound.

1. What is the optimal output for the production division?
2. What is the optimal output for the marketing division?
3. What is the optimal transfer price for the basic plastic item?
4. At what price should the marketing division sell its product?