∂ 8.1 figure it out

Suppose that consumers see haircuts as an undifferentiated good and that there are hundreds of barbershops in the market. The current market equilibrium price of a haircut is $15. Bob's Barbershop has a daily short-run total cost given by $TC = 0.5Q^2$. The associated marginal cost curve is $MC = Q$.

a. How many haircuts should Bob give each day if he wants to maximize profit?

b. If the firm maximizes profit, how much profit will it earn each day?

c. Express profit as a function of Q, maximize this function using calculus, and show that the solution is the same as your answer to part (b).

Solution:

a. Firms in perfect competition maximize profit by producing the quantity for which $P = MC$:

$$P = MC$$
$$15 = Q$$

b. If Bob gives 15 haircuts and charges $15 for each, the total revenue will be

$$TR = P \times Q$$
$$= \$15 \times 15 = \$225$$

We can use the firm's total cost function to find the total cost of producing 15 haircuts:

$$TC = 0.5Q^2 = 0.5(15)^2 = \$112.50$$

Since profit is $TR - TC$,

$$\pi = \$225 - \$112.50 = \$112.50 \text{ per day}$$

c. The firm's profit function is $\pi = 15Q - 0.5Q^2$. Maximizing this function with respect to Q, we see that the first-order condition is $15 - Q = 0$ or $Q = 15$. This is the same as what's found in part (b).