Profit, Cost, and Revenue

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Maximizing profit

- A fundamental issue for a producer is how to maximizing profit.
- \( \pi(q) = R(q) - C(q) \)
- \( MC = C' \): Marginal cost; \( MR = R' \): Marginal revenue
Example

Estimating maximum profit if the revenue and cost are given by the curves $R$ and $C$, respectively, in the figure.
Example

- Profit = Revenue − Cost
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- Profit is represented by the vertical distance from curve $C$ to curve $R$, marked by vertical arrow.

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- Profit = Revenue – Cost
- Profit is represented by the vertical distance from curve C to curve R, marked by vertical arrow.
- Arrow is going down \(\rightarrow\) No profit
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- Arrow is going down $\Rightarrow$ No profit
- Arrow is going up $\Rightarrow$ Making profit

Profit, Cost, and Revenue
Example

- Profit = Revenue − Cost
- Profit is represented by the vertical distance from curve $C$ to curve $R$, marked by vertical arrow.
- Arrow is going down $\implies$ No profit
- Arrow is going up $\implies$ Making profit
- Profit is maximized if the arrow is going up and has the largest distance.
We now analyze the marginal costs and marginal revenues near the optimal point.

\[ \pi'(q) = R'(q) - C'(q) = 0 \]

\[ MR = R' = C' = MC. \]
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The maximum or minimum profit can occur where marginal profit = 0. That is where marginal revenue = marginal cost.
Example

The (total) revenue and (total) cost curves for a product are given in the Figure.
(a) Sketch (roughly) the marginal cost and revenue.
(b) Graph the profit function $\pi(q)$. 

![Graph showing revenue (R) and cost (C) curves with profit function $\pi(q)$]
Example

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Example

Find the quantity which maximizes the profit if the total revenue and total cost (in dollars) are given by

$R(q) = 5q - 0.003q^2$

$C(q) = 300 + 1.1q$

where $q$ is quantity and $0 \leq q \leq 1000$ units. What production level gives the maximize profit?
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- Find the demand equation.
Maximize Revenue

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- Express revenue as a function of price
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- Find the demand equation.
- Express revenue as a function of price
- What price should the company charge per trip to maximize revenue?
At a price of $80 for a half-day trip, a white-water rafting company attracts 300 customers. Every $5 decrease in price attracts an additional 30 customers.