Applying the Monopoly Model

Quantity	45
Price	$27.50
Revenue	$1237.50
Cost	$225
Profit	= Revenue – Cost = $1227.50 - $225

An Application

- Lets do some simple applications, first mathematically and then using a spreadsheet.

The Demand Functions

$$\boldsymbol{Q = 100 - 2P}$$

The Demand Function

$$\boldsymbol{Q = 100 - 2P}$$

$$\boldsymbol{MC = 5}$$

Step One

$$Q = 100 - 2P$$

$$MC = 5$$

- Find where

$$MR = MC$$

Finding MR

$$\boldsymbol{R = PQ}$$

Finding MR

$$R = PQ$$

$$Q = 100 - 2P$$

$$P = 50 - (1/2)Q$$

$$R = [50-(1/2)Q]Q$$

Finding MR

$$R = PQ$$

$$Q = 100 - 2P$$

$$P = 50 - (1/2)Q$$

$$R = [50-(1/2)Q]Q$$

$$R = 50Q - (1/2)Q^2$$

An Application

$$MR = \frac{dR}{dQ}$$

An Application

$$MR = \frac{dR}{dQ}$$

- We must find the derivative of our equation

$$R = 50Q - (1/2)Q^2$$

Derivative Review

- The derivative of

$$ax^2 + bx + c$$

Derivative Review

- The derivative of

$$ax^2 + bx + c$$

is

$$2ax+b$$

Derivative Review

- The derivative of

  $ax^2 + bx + c$ $\quad$ $50Q - (1/2)Q^2$

  is

  $2ax+b$

Derivative Review

- The derivative of

  $ax^2 + bx + c$ $\quad$ $50Q - (1/2)Q^2$

  is

  $2ax+b$ $\quad$ $50 - Q$

Set MR = MC

$MR = 50 - Q$

Set MR = MC

$MR = 50 - Q$

$MR = MC$

$50\text{-}Q = 5$

$Q = 45$

Step Two

- What price will the monopolist charge? Remember the inverse demand function

$$P = 50 - (1/2)Q$$

Finding the Price

- What price will the monopolist charge? Remember the inverse demand function

$$P = 50 - (1/2)Q$$

$$P = 50 - (1/2)(45)$$

Finding the Price

- What price will the monopolist charge? Remember the inverse demand function

$$P = 50 - (1/2)Q$$

$$P = 50 - (1/2)(45)$$

$$P = 27.5$$

Finding Price

- Working from the demand function

$$Q = 100 - 2P$$

Finding Price

- Working from the demand function

$$Q = 100 - 2P$$

$$45 = 100 - 2P$$

$$P = 27.5$$

Last Steps

Quantity	
Price	
Revenue	
Cost	
Profit	

We Know

Quantity	*45*
Price	*$27.50*
Revenue	
Cost	
Profit	

Revenue

Quantity	**45**
Price	**$27.50**
Revenue	**= P Q**
Cost	
Profit	

Revenue

Quantity	***45***
Price	***$27.50***
Revenue	*= (27.5)(45)*
Cost	
Profit	

Revenue

Quantity	***45***
Price	***$27.50***
Revenue	***= (27.5)(45)= $1237.50***
Cost	
Profit	

Total Cost

Quantity	45
Price	$27.50
Revenue	$1237.50
Cost	***= 5Q = 5(45) = $225***
Profit	

π

Quantity	45
Price	$27.50
Revenue	$1237.50
Cost	$225
Profit	= Revenue – Cost = $1227.50 - $225

π

Quantity	***45***
Price	***$27.50***
Revenue	***$1237.50***
Cost	***$225***
Profit	***$1012.50***

An Application

- Find the value of Q at which MR = MC

Review

- Find MC

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Review

- Find MC
- Find MR

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Review

- Find MC
- Find MR
  - The Revenue Function is PQ

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Review

- Find MC
- Find MR
  - The Revenue Function is PQ
  - Solve for the inverse demand function

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Review

- Find MC
- Find MR
  - The Revenue Function is PQ
  - Solve for the inverse demand function
  - Substitute for P into the revenue function

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Review

- Find MC
- Find MR
  - The Revenue Function is PQ
  - Solve for the inverse demand function
  - Substitute for P into the revenue function

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An Application

- Find the valu R = MC
- Find MC
- Find MR
  - Solve for th ction
  - Substitute f function
  - Find the derivative

$$MR = \frac{dR}{dQ}$$

$$MR = MC$$

A spreadsheet approach

- An alternative means of doing the problem is to build a spreadsheet. Lets work through that approach.

End