



Business Analytics

Today Objective

Price Analytics

Price Analytics



- Understanding How pricing impacts revenues and profitability is one of the most important issues faced by managers.
- To do so, managers need to understand how consumers willingness to purchase changes at different prices levels and how these changes impact profitability.

Price Analytics



Demand Curves

- Used to estimate price that should be charged for maximum profits
- The best price for a product maximizes margins – not unit sales



$$12 \text{ units} * \$5 = \$60$$

$$50 \text{ units} * \$1 = \$50$$

Price Analytics



Case : Transform Printers

Mr. Sailesh Mahadevi thought of starting a company providing excellent quality printers

With time many new players have emerged

This lead to increase in the competition in the market

TP has always beat the competition by the quality of its products

However, the time does not remain constant. With the changing time, all the major players have acquired competitive technology for high-quality printing.

Quality is no longer a competitive advantage for TP

With the 1% change in prices the demand changes by 2%.

As a result, TP has to lose a major chunk of its market share to its competitors

Current demand for printers is 5000 units at price of \$75

What is the best price to charge for a printer to maximize the profits?

The average cost incurred in producing a printer is approximate \$59



Price Analytics

The screenshot shows the Microsoft Excel interface with the following data in the worksheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
1	Price	Demand																		
2	75	5000																		
3	75.75	4900																		

The 'Insert' tab is active, and the 'Scatter' chart type is selected. A tooltip for 'Scatter with only Markers' is visible, providing the following instructions:

- Compare pairs of values.
- Use it when the values are not in x-axis order or when they represent separate measurements.

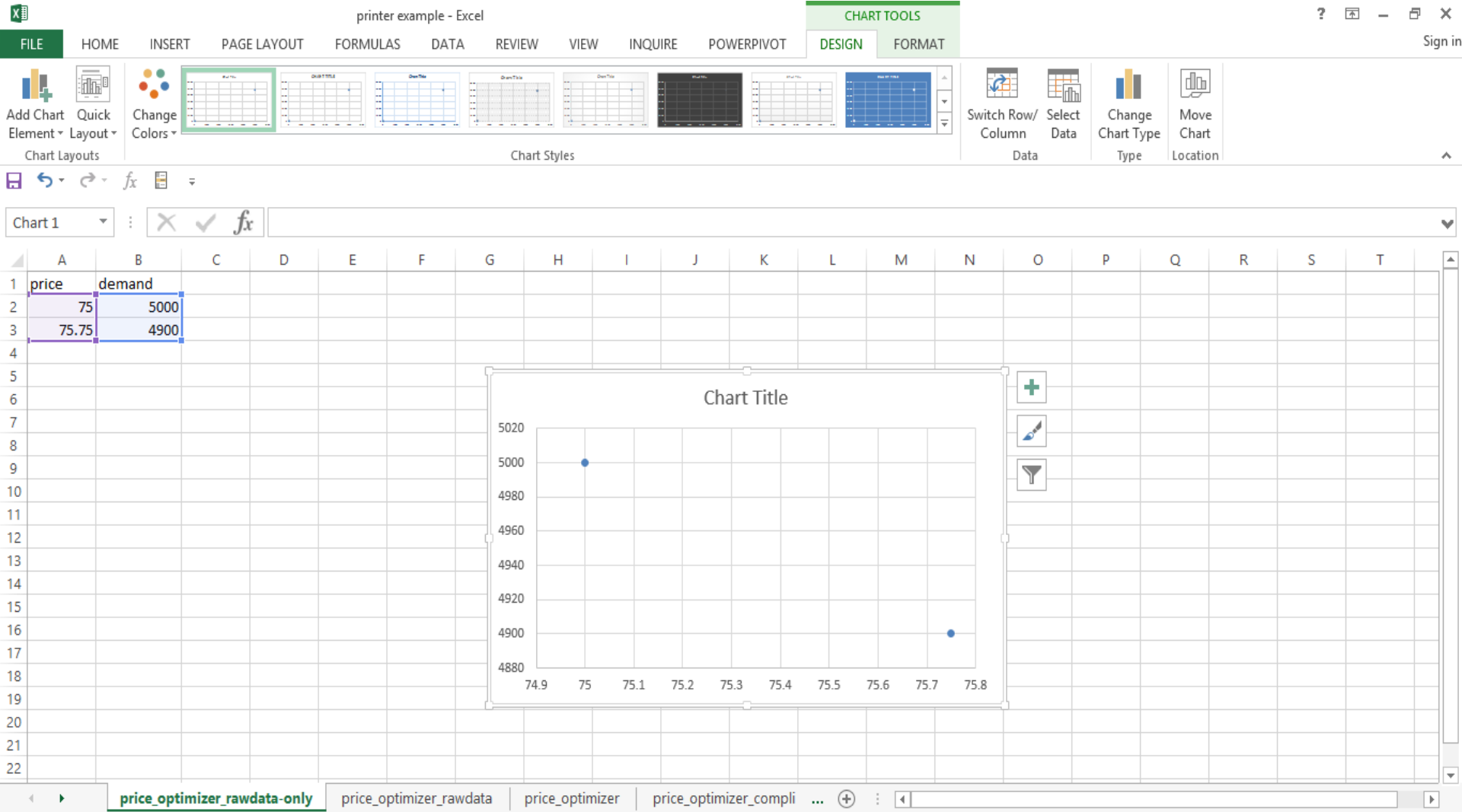
Two callout boxes provide additional instructions:

- Select data cells by dragging over with the mouse** (pointing to the selected data range).
- Insert Scatter with only Markers chart** (pointing to the selected chart type).

The status bar at the bottom shows: Average: 2512.6875, Count: 4, Sum: 10050.75, 100% zoom.



Price Analytics





Price Analytics

Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins Design Layout Format

Chart Tools: Design, Layout, Format

Chart 1

	A	B	C	D	E	F
1	Price	Demand				
2		75	5000			
3		75.75	4900			
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Format Trendline

Trendline Options

Line Color

Line Style

Shadow

Glow and Soft Edges

Trend/Regression Type

- Exponential
- Linear
- Logarithmic
- Polynomial Order: 2
- Power
- Moving Average Period: 2

Trendline Name

- Automatic: Linear (Series1)
- Custom:

Forecast

Forward: 0.0 periods

Backward: 0.0 periods

- Set Intercept = 0.0
- Display Equation on chart
- Display R-squared value on chart

Close

Change Chart Type Save As Chart Template Switch Row/Column Select Data

Chart Layouts

Move Chart Location

N O P Q R S

Sheet1 Sheet2 Sheet3

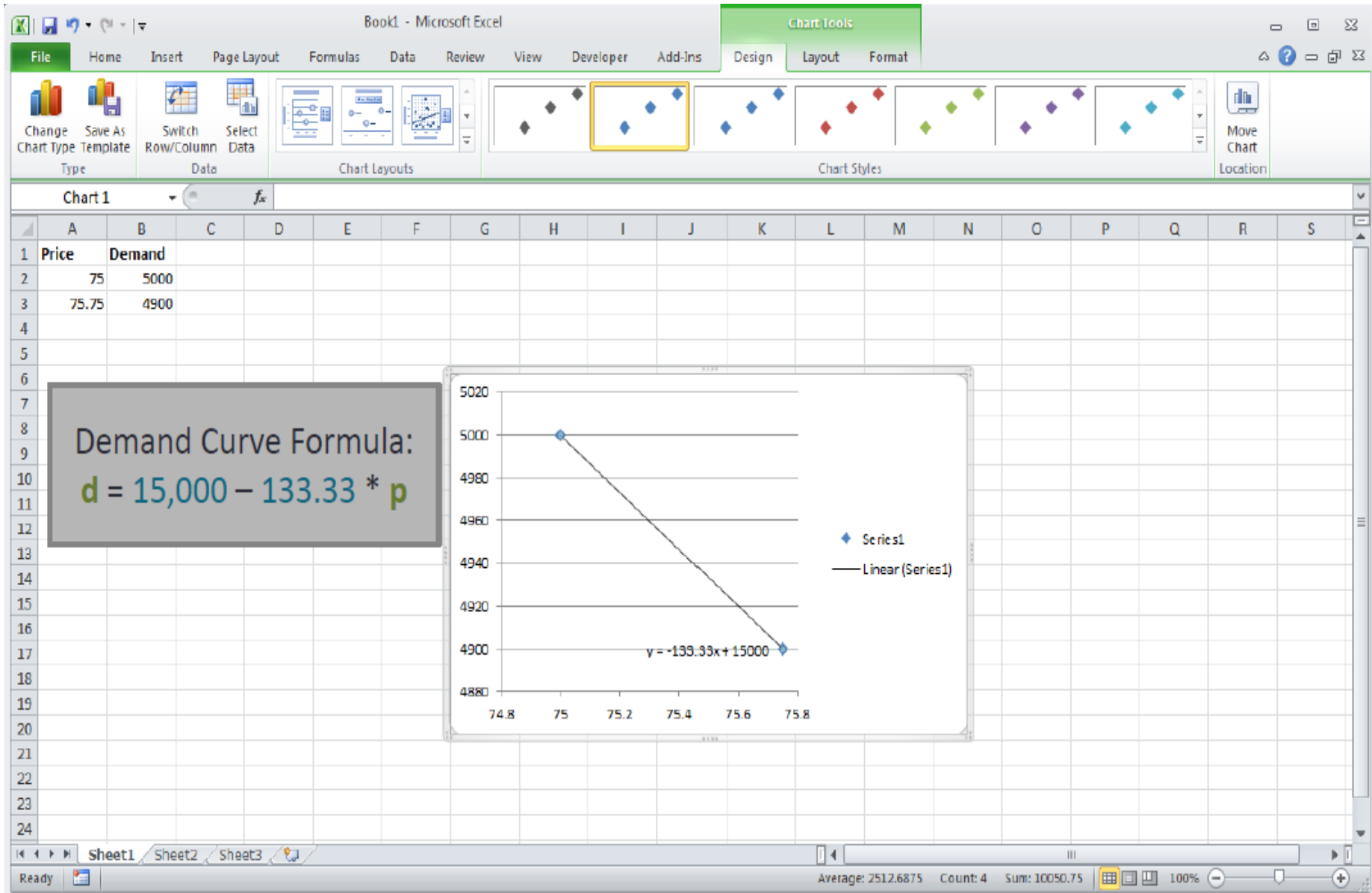
Ready Average: 2512.6875 Count: 4 Sum: 10050.75 100%

Check option to Display Equation on chart

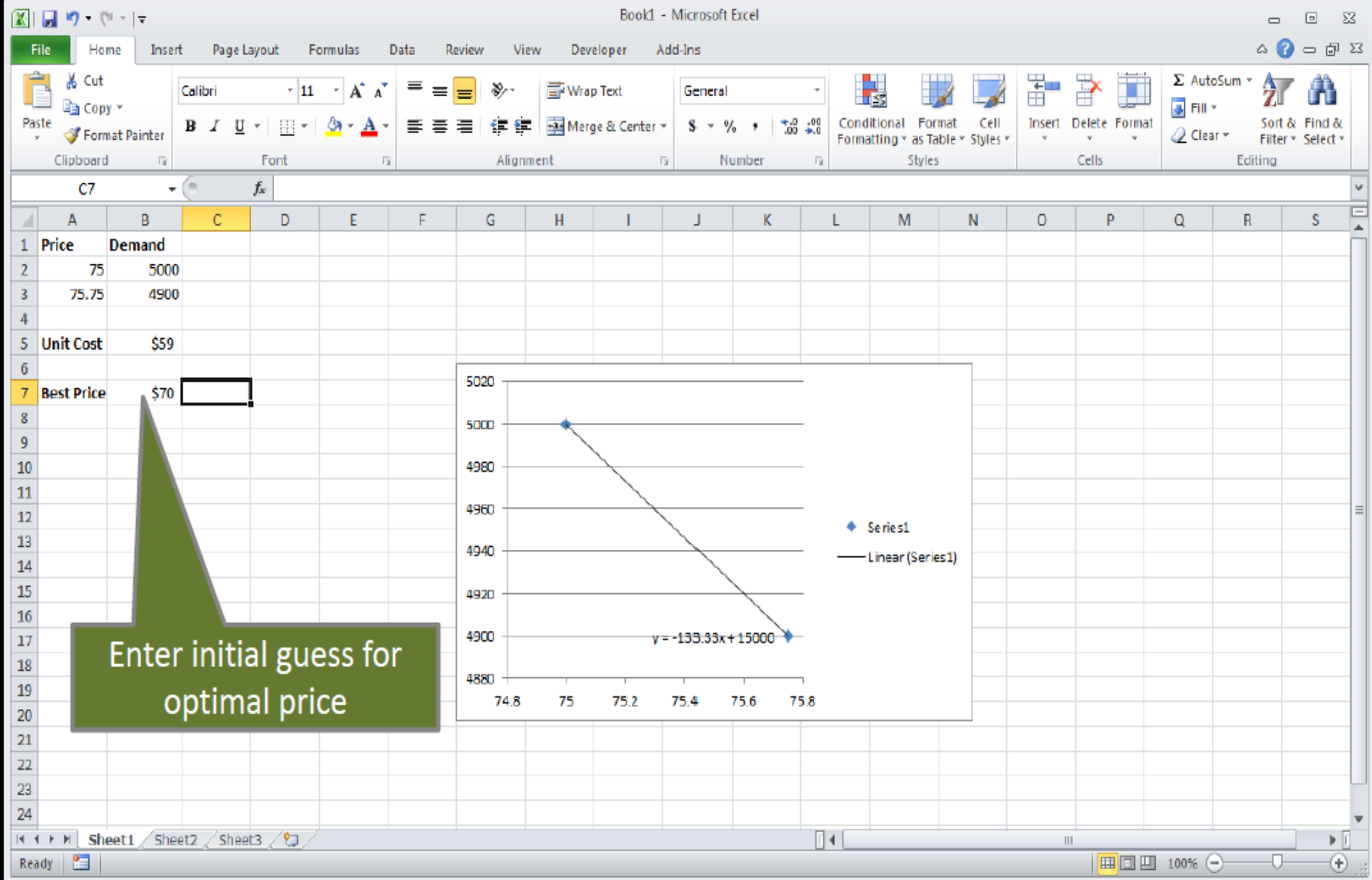
Select Linear Trendline

Click Close button

Price Analytics



Price Analytics





Price Analytics

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Clipboard Font Alignment Number Styles Cells Editing

AutoSum Fill Clear Sort & Filter Find & Select

DDB $=B8*(B7-B5)$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
1	Price	Demand																		
2	75	5000																		
3	75.75	4900																		
4																				
5	Unit Cost	\$59																		
6																				
7	Best Price	\$70																		
8	Demand	5,666.90																		
9	Profit	$=B8*(B7-B5)$																		

Enter

Accept formula

Total Profit = (Price - Unit Cost) * Demand

Enter profit formula:
 $=B8*(B7-B5)$

Sheet1 Sheet2 Sheet3

Enter 100%

Price Analytics



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File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Get External Data Existing Connections Refresh All Connections Sort Filter Clear Reapply Advanced Text to Columns Remove Duplicates Data Validation Consolidate What-If Analysis Group Ungroup Subtotal Data Analysis Solver

B9 =B8*(B7-B5)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q
1	Price	Demand														
2		75	5000													
3		75.75	4900													
4																
5	Unit Cost	\$59														
6																
7	Best Price	\$70														
8	Demand	5,666.90														
9	Profit	\$62,335.90														
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																

Start Solver

Series1
Linear (Series1)
 $y = -133.33x + 15000$

Ready Sheet1 Sheet2 Sheet3 100%

Price Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Get External Data Existing Connections Refresh All Edit Connections Connections Clear Solver Data Analysis Solver Outline Analysis

	A	B	C	D	E
1	Price	Demand			
2		75	5000		
3		75.75	4900		
4					
5	Unit Cost	\$59			
6					
7	Best Price	\$70			
8	Demand	5,666.90			
9	Profit	\$62,335.90			

Solver Parameters

Set Objective:

To: Max Min Value Of:

By Changing Variable Cells:

Subject to the Constraints:

Make Unconstrained Variables Non-Negative

Select a Solving Method:

Solving Method
Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Buttons: Add, Change, Delete, Reset All, Load/Save, Options, Help, Solve, Close

Maximize

Total Profit

By changing price

Price Analytics



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File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Existing Connections Refresh All Connections Properties Edit Links Sort Filter Clear Reapply Advanced Text to Columns Remove Duplicates Validation Data Tools Consolidate What-If Analysis Group Ungroup Subtotal Outline Analysis Solver

	A	B	C	D	J	K	L	M	N	O	P	Q	R	S
1	Price	Demand												
2		75	5000											
3		75.75	4900											
4														
5	Unit Cost	\$59												
6														
7	Best Price	\$86												
8	Demand	3,566.77												
9	Profit	\$95,415.98												
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														

Optimal price per printer: \$86

Total profit: \$95,415.98

Solver Results

Solver found a solution. All Constraints and optimality conditions are satisfied.

Keep Solver Solution
 Restore Original Values

Return to Solver Parameters Dialog Outline Reports

Reports
Answer
Sensitivity
Limits

OK Cancel Save Scenario...

Solver found a solution. All Constraints and optimality conditions are satisfied.
When the GRG engine is used, Solver has found at least a local optimal solution. When Simplex LP is used, this means Solver has found a global optimal solution.

Price Analytics



Case :Part2

The competitors have reduced the price of a printer to \$55, which is far better than the price of TP printers

Mr. Mahadevi called up a meeting of the management team and discussed all the concerns

In next meeting, it came to light that almost all the competitors are not in the business of manufacturing printers only. Most of them manufacture and offer printer cartridges as **complementary products**

Mr. Mahadevi is unable to understand how the competitors can cover up the costs of production for printers

They decided to analyze the competitors' products and business and meet again after finding some of the possible sources of funding

On further analysis, they found that the average lifetime of TP printers is three years while the mean lifetime of a cartridge is six months and customer buy more than one cartridge

Price Analytics



The production set up for cartridges do not require much effort and cost because the resources used are almost similar to those needed for manufacturing printers. The average cost of producing a cartridge is \$4 only. It is sold at \$16 per unit in the market.

As the earnings per unit are significant for cartridges, so, Mr. Mahadevi is thinking of producing cartridges as well. Can this be an option for fighting the competitors in printers' market?
Check feasibility of this option?

Price Analytics



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File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Unit Cost	\$59															
2	Cartridges per printer	6															
3	Profit per cartridge	\$12															
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
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16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	

Profit per ink cartridge sold

Ink cartridges we'll sell per printer

Price Analytics



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Clipboard Font Alignment Number Styles Cells Editing

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Unit Cost	\$59															
2	Cartridges per printer	6															
3	Profit per cartridge	\$12															
4	Best price	\$70															
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
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15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	

Initial guess for optimal price

Sheet1 Sheet2 Sheet3

Ready 100%

Price Analytics



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File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

DDB $=15000-133.3*B4$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Unit Cost	Enter															
2	Cartridges per printer	6															
3	Profit per cartridge	\$12															
4	Best price	\$70															
5	Demand	$100-133.3*B4$															
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	

Enter demand formula:
 $=15000-133.3*B7$

Sheet1 Sheet2 Sheet3

Point 100%

Price Analytics



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File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Cut Copy Paste Format Painter Clipboard Font Alignment Number Conditional Formatting Styles Insert Delete Format Cells

DDB $=B5*(B4-B1)+B5*B2*B3$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Unit Cost	Enter													
2	Cartridges per printer	6													
3	Profit per cartridge	\$12													
4	Best price	\$70													
5	Demand	5,669													
6	Total profit	$(1)+B5*B2*B3$													
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															

Printer Profits = [(Price - Unit Cost) * Demand] + (Demand * Cartridges per Printer * Profit per Cartridge)

Price Analytics



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File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Existing Connections Refresh All Properties Edit Links Connections Sort Filter Clear Reapply Advanced Text to Columns Remove Duplicates Data Validation Consolidate What-If Analysis Group Ungroup Subtotal Data Analysis Solver

B6 fx =B5*(B4-B1)+B5*B2*B3

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Unit Cost	\$59												
2	Cartridges per printer	6												
3	Profit per cartridge	\$12												
4	Best price	\$70												
5	Demand	5,669												
6	Total profit	\$470,527.00												
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														

Solver

What-if analysis tool that finds optimal value of a target cell by changing values in cells used to calculate the target cell.

SOLVER.XLAM
Press F1 for add-in help.

Start Solver

Sheet1 Sheet2 Sheet3

Ready 100%

Price Analytics



The screenshot shows the Microsoft Excel Solver Parameters dialog box. The 'Set Objective' field is set to '\$B\$9', which is annotated with a green box labeled 'Total Profit'. The 'To:' section has the 'Max' radio button selected, annotated with a green box labeled 'Maximize'. The 'By Changing Variable Cells' field is set to '\$B\$7', annotated with a green box labeled 'By changing price'. The 'Solve' button is highlighted in blue and annotated with a green box labeled 'Click Solve'. The background spreadsheet shows columns for Price, Demand, Unit Cost, Best Price, and Profit, with the Profit cell containing the value \$62,335.90.

	A	B	C	D	E
1	Price	Demand			
2	75	5000			
3	75.75	4900			
4					
5	Unit Cost	\$59			
6					
7	Best Price	\$70			
8	Demand	5,665.90			
9	Profit	\$62,335.90			

Price Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Existing Connections Refresh All Connections

Connections A Z Clear

Consolidate What-If Analysis Group Ungroup Subtotal Outline Analysis

fx =B5*(B4-B1)+B5*B2

	A	B	C	D
1	Unit Cost	\$59		
2	Cartridges per printer	6		
3	Profit per cartridge	\$12		
4	Best price	\$50		
5	Demand	8,366		
6	Total profit	\$525,112.42		

Solver Results

Solver has converged to the current solution. All Constraints are satisfied.

Keep Solver Solution
 Restore Original Values

Return to Solver Parameters Dialog Outline Reports

OK Cancel Save Scenario...

Reports
Answer Sensitivity Limits

Solver has converged to the current solution. All Constraints are satisfied.

Solver has performed 5 iterations for which the objective did not move significantly. Try a smaller convergence setting, or a different starting point.

Best price for our printers is a \$9 loss per sale!!

Total profit: \$525,112.42

Price Analytics



In situation when you do not know the price elasticity for a product or do not think you can rely on linear or power demand curve.

Determine a product demand curve is to identify the lowest price and highest price that seems reasonable. (ref: power pricing book by Robert Dolan)



Price Analytics

As per Robert..

$$\text{Demand} = a(\text{price})^2 + b(\text{price}) + c$$

Example:

Suppose that a drugstore pays \$0.90 for each unit of chapstick it orders.

The store is considering charging from \$1.50-\$2.50 for a unit of chapstick.

It thinks that at a price of \$1.50, it can sell 60 unit per week, at a price of \$2.00, it can sell 51 unit per week. at a price of \$2.50, it can sell 20 unit per week.

To Determine what price the store should charge for chapstick .

Now we go for performing through excel

Price Analytics



Enter unit cost

Enter different prices in different cell

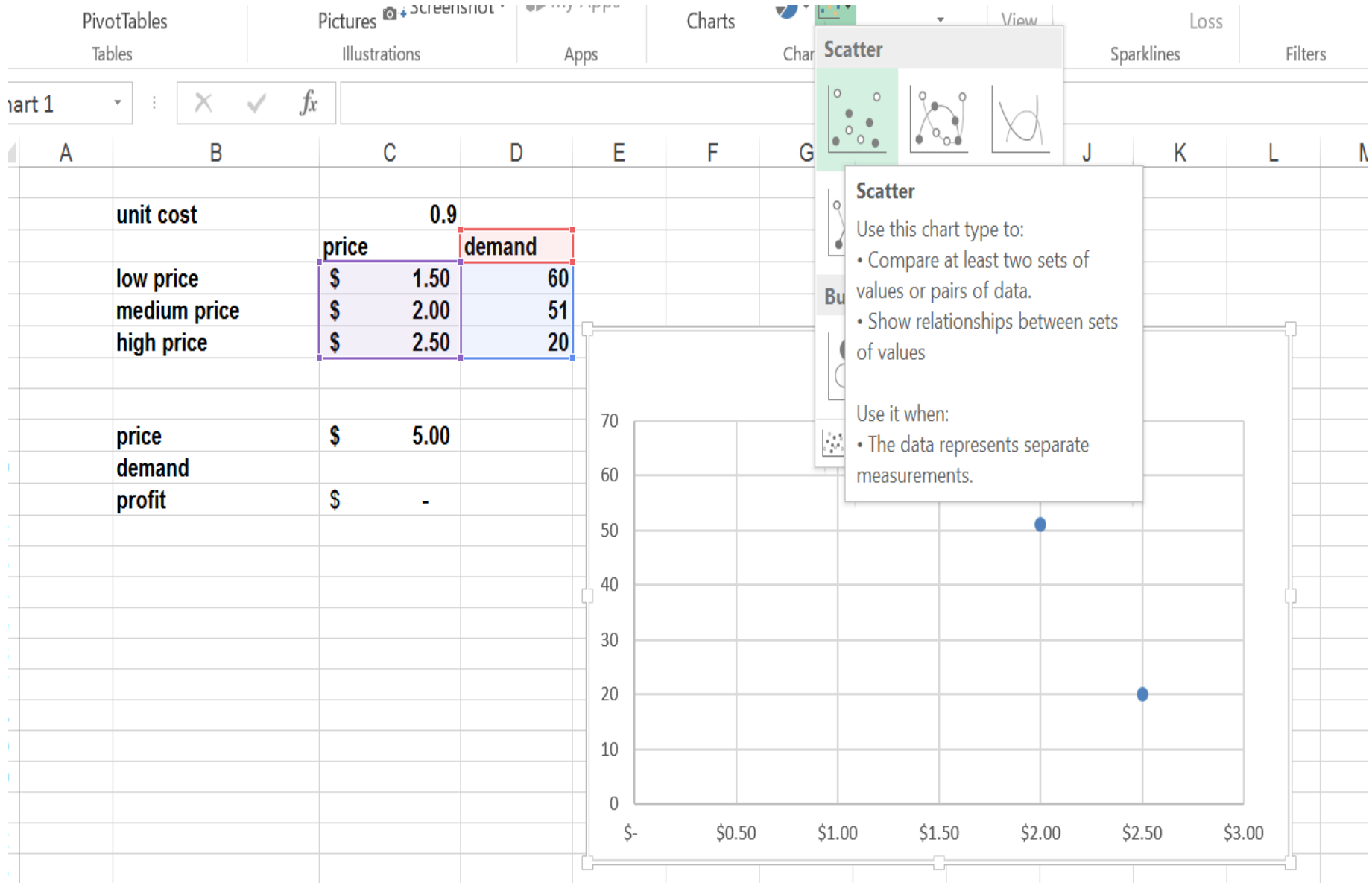
unit cost		0.9	
	price		demand
low price	\$	1.50	60
medium price	\$	2.00	51
high price	\$	2.50	20

Price Analytics

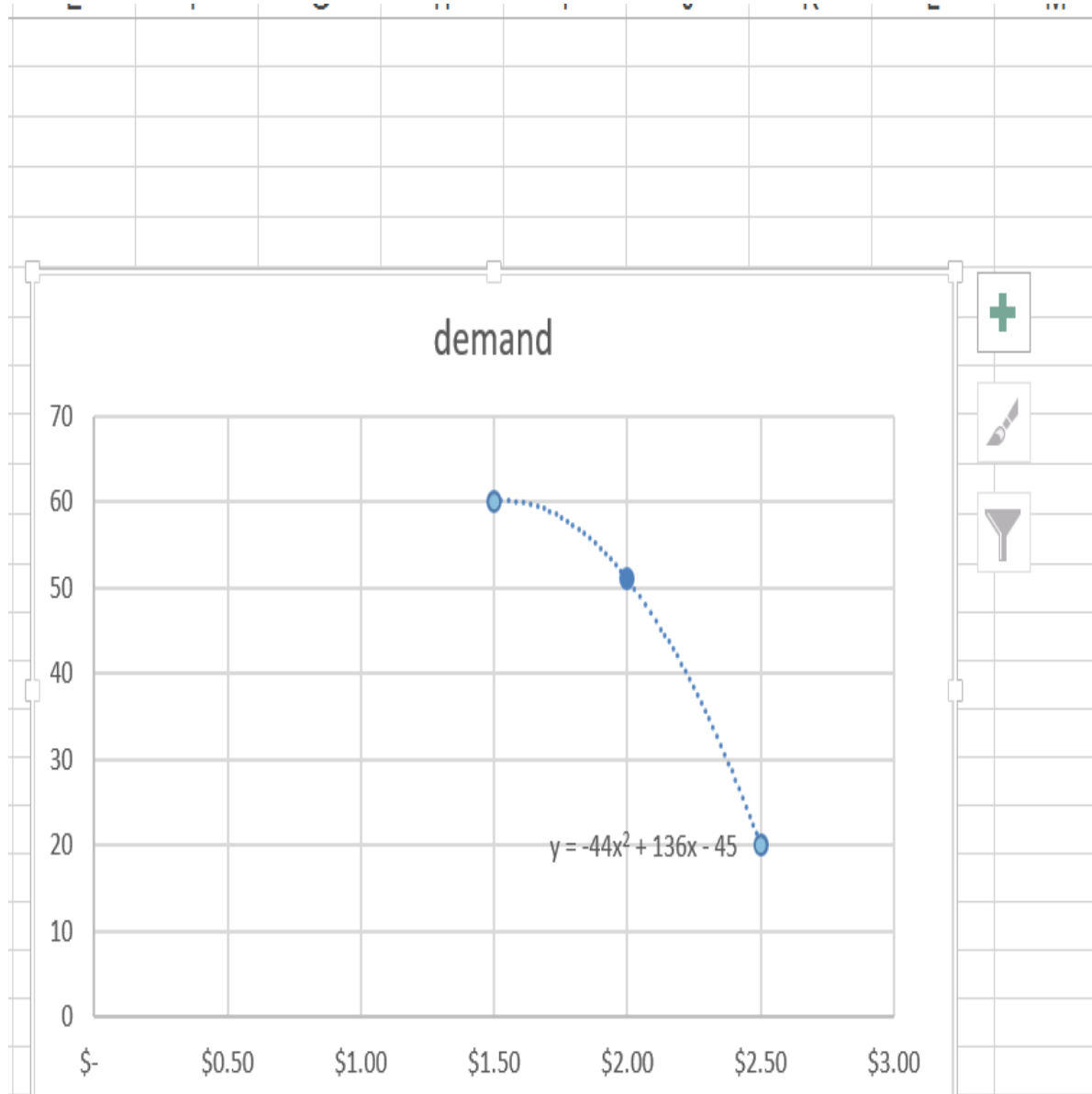


	A	B	C	D	E
1					
2		unit cost	0.9		
3			price	demand	
4		low price	\$ 1.50	60	
5		medium price	\$ 2.00	51	
6		high price	\$ 2.50	20	
7					
8					
9		price	\$ 5.00		
10		demand			
11		profit	\$ -		
12					

Price Analytics



Price Analytics



Format Trendline

TRENDLINE OPTIONS



Logarithmic

Polynomial Order

Power

Moving Average Period

Trendline Name

Automatic Poly. (demand)

Custom

Forecast

Forward periods

Backward periods

Price Analytics



Board



Font



AI

✕ ✓ *fx* =136*C9-45-44*C9^2

	B	C	D
unit cost		0.9	
		price	demand
low price	\$	1.50	60
medium price	\$	2.00	51
high price	\$	2.50	20
price	\$	5.00	
demand		=136*C9-45-44*C9^2	
profit	\$	(1,906.50)	

Price Analytics



Enter

Solver Parameters

Set Objective:

To: Max Min Value Of:

By Changing Variable Cells:

Subject to the Constraints:

Make Unconstrained Variables Non-Negative

Select a Solving Method:

Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Buttons: Add, Change, Delete, Reset All, Load/Save, Options, Help, Solve, Close

Price Analytics



Set objective: profit value

By changing :trial price value

Subject to the constraints : prices between 1.50 -2.50

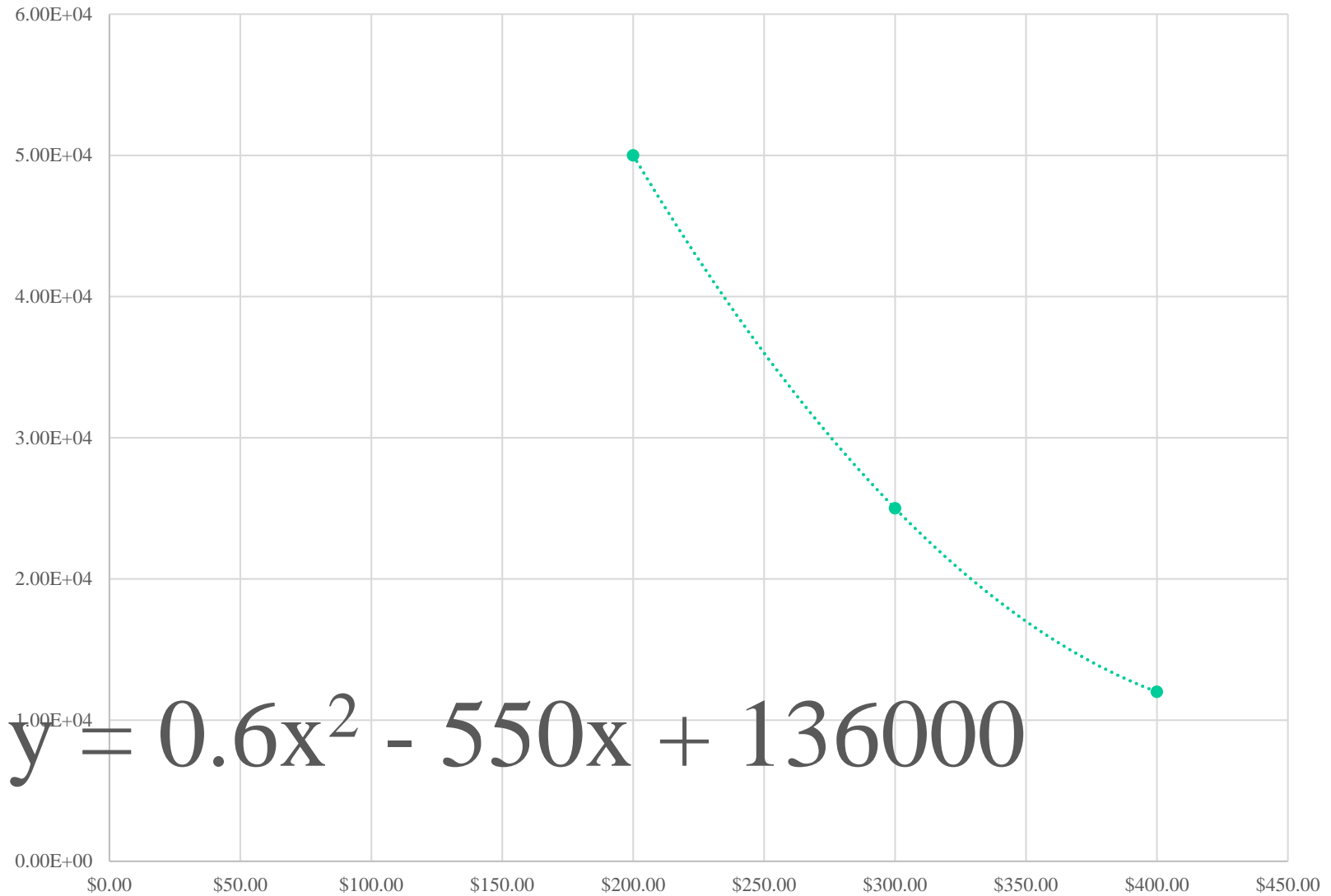
C	A	B	C	D
1				
2		unit cost	0.9	
3			price	demand
4		low price	\$ 1.50	60
5		medium price	\$ 2.00	51
6		high price	\$ 2.50	20
7				
8				
9		price	\$ 2.04	
10		demand	\$ 49.40	
11		profit	\$ 56.24	
12				
13				
14				
15				
16				
17				



Case: Suppose it costs \$250 to produce a video game console. A price between \$200 and \$400 is under consideration. Estimated demand for the game console is shown in the following table. What price should you charge for game console?

Price	Demand
\$200	50,000
\$300	25,000
\$400	12,000

demand





Font



Alignment

⋮



fx

=0.6*D12^2-550*D12+136000

B	C	D	E	Fo
	Xbox			
	Unit Cost	S	250.00	
	Console Price demand			
	\$200.00		5.00E+04	
	\$300.00		2.50E+04	
	\$400.00		1.20E+04	
	Console Price		\$600.00	
	Console Demand		\$22,000.00	
	Console			



X ✓ fx

=D15*(D12)

B	C	D
	Xbox	
	Unit Cost	\$ 250.00
	Console Price demand	
	\$200.00	5.00E+04
	\$300.00	2.50E+04
	\$400.00	1.20E+04
	Console Price	\$600.00
	Console Demand	\$22,000.00
	Console Fevenue	\$13,200,000.00



X ✓ fx =D15*D4

B	C	D
	Xbox	
	Unit Cost	\$ 250.00
	Console Price	demand
	\$200.00	5.00E+04
	\$300.00	2.50E+04
	\$400.00	1.20E+04
	Console Price	\$600.00
	Console Demand	\$22,000.00
	Console Revenue	\$13,200,000.00
	Console Cost	=D15*D4



Font Alignment

X ✓ fx

=D16-D17

B	C	D	E
	Xbox		
	Unit Cost	\$ 250.00	
	Console Price demand		
	\$200.00	5.00E+04	
	\$300.00	2.50E+04	
	\$400.00	1.20E+04	
	Console Price	\$600.00	
	Console Demand	\$22,000.00	
	Console Revenue	\$13,200,000.00	
	Console Cost	\$5,500,000.00	
	Total Profit	=D16-D17	



Solver Parameters



Set Objective:

\$D\$19



To:

Max

Min

Value Of:

0

By Changing Variable Cells:

\$D\$12



Subject to the Constraints:

\$D\$12 <= 400
\$D\$12 >= 200



Add

Change

Delete

Reset All

Load/Save

Make Unconstrained Variables Non-Negative

Select a Solving Method:

GRG Nonlinear



Options

Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.



X		✓	fx	=D16-D17
B	C	D		
	Xbox			
	Unit Cost	\$	250.00	
	Console Price	demand		
	\$200.00		5.00E+04	
	\$300.00		2.50E+04	
	\$400.00		1.20E+04	
	Console Price		\$400.00	
	Console Demand		\$12,000.00	

Solver Results

Solver found a solution. All Constraints and optimality conditions are satisfied.

Keep Solver Solution

Restore Original Values

Return to Solver Parameters Dialog

Outline Reports

Reports

- Answer
- Sensitivity
- Limits

OK **Cancel** **Save Scenario...**

Solver found a solution. All Constraints and optimality conditions are satisfied.

When the GRG engine is used, Solver has found at least a local optimal solution. When Simplex LP is used, this means Solver has found a global optimal solution.

\$0.00 \$50.00 \$100.00 \$150.00 \$200.00 \$250.00 \$300.00 \$350.00 \$400.00



Segmenting Customers to Maximize Revenue

Revenue Analytics



Example: Malaysia Airlines Flight 19

- Valuations effectively the same as points on the demand curve
- Calculate demand by finding number of people who would buy tickets at each price point

\$463	\$732
\$569	\$701
\$457	\$746
\$719	\$607
\$758	\$685



Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

C12

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1			Price																
2			\$463																
3			\$569																
4			\$457																
5			\$719																
6			\$758																
7			\$732																
8			\$701																
9			\$746																
10			\$607																
11			\$685																
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			

Enter fare valuations from passenger survey

Sheet1 Sheet2 Sheet3

Ready 100%

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

DDB X ✓ fx =COUNTIF(\$C\$2:\$C\$11,">="&C2)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
1	Sample D	Price	Enter																
2	>="&C2)	\$463																	
3		\$569																	
4		\$457																	
5		\$755																	
6		\$732																	
7		\$701																	
8		\$746																	
9		\$607																	
10		\$685																	
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			

Accept formula

Enter demand summing formula:
=COUNTIF(\$C\$2:\$C\$11, ">="&C2)

Sheet1 Sheet2 Sheet3

100%

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

A2 $=\text{COUNTIF}(\text{C\$2}:\text{C\$11}, ">=" \& \text{C2})$

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
1	Sample D	Price																	
2	9	\$463																	
3		\$569																	
4		\$457																	
5		\$719																	
6		\$732																	
7		\$701																	
8		\$746																	
9		\$607																	
10		\$685																	
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			

Select handle at bottom right of formula cell, then drag down

Sheet1 Sheet2 Sheet3

Drag outside selection to extend series or fill; drag inside to clear

100%

Revenue Analytics



Sample D	Demand	Price
9	=A2*50	\$463
8		\$569
10		\$430
4		\$719
1		\$758
3		\$732
5		\$701
2		\$746
7		\$607
6		\$685

Accept formula

Enter market adjustment formula:
 $=A2*50$

because this is 2 parentage of your demand ,multiply the previous demand estimate by 50.

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

B2 $=A2*50$

Sample	Demand	Price
9	450	\$463
8		\$569
10		\$57
4		\$75
1		\$758
3		\$732
5		\$701
2		\$746
7		\$607
6		\$685

Select handle at bottom right of formula cell, then drag down

Sheet1 Sheet2 Sheet3

Drag outside selection to extend series or fill; drag inside to clear

100%

Revenue Analytics



The screenshot shows a Microsoft Excel spreadsheet with the following data:

Sample	Demand	Price
9	450	\$463
8	400	\$569
10	500	\$457
4	200	\$719
1	50	\$758
3	150	\$732
5	250	\$701
2	100	\$746
7	350	\$607
6	300	\$685

A callout box with a green background and white text points to the data cells, containing the instruction: "Select cells containing demand and price data".

Revenue Analytics



The screenshot shows the Microsoft Excel interface with the following data table selected in the range B2:C11:

Sample	Demand	Price
9	450	\$463
8	400	\$569
10	500	\$457
4	200	\$719
1	50	\$758
3	150	\$732
5	250	\$701
2	100	\$746
7	350	\$607
6	300	\$685

The 'Scatter' chart type is selected in the ribbon, and the 'Scatter With Only Markers' option is highlighted in the dropdown menu. A green callout box points to this option with the text: "Choose 'Scatter With Only Markers'"

Revenue Analytics



Book1 - Microsoft Excel

Chart Tools: Design, Layout, Format

Chart 1: =SERIES(.Sheet1!\$B\$2:\$B\$11,Sheet1!\$C\$2:\$C\$11,1)

Sample	Demand	Price
9	450	\$463
8	400	\$569
10	500	\$457
4	200	\$719
1	50	\$758
3	150	\$732
5	250	\$701
2	100	\$746
7	350	\$607
6	300	\$685

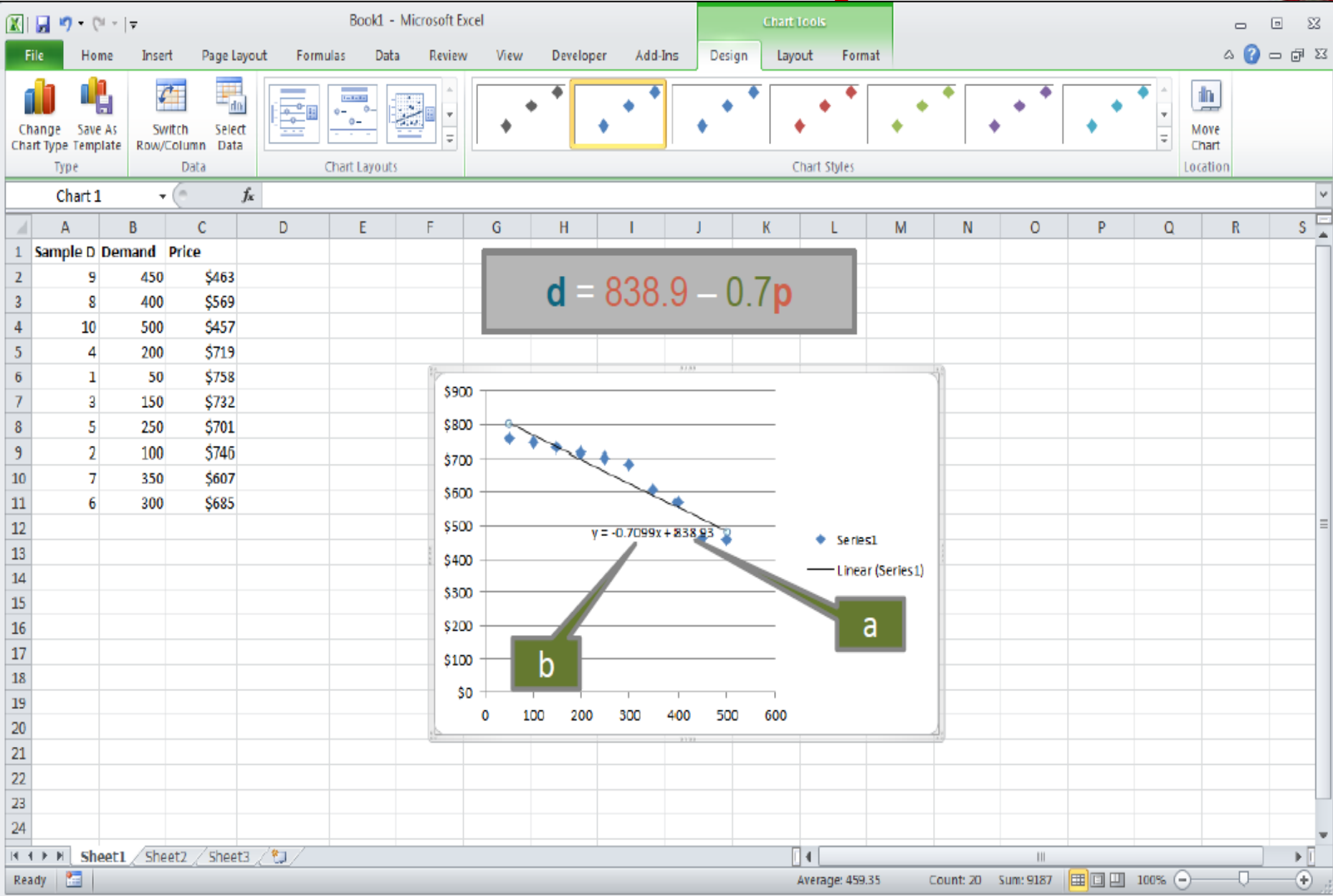
$d = a - bp$

Right-click one of the data points

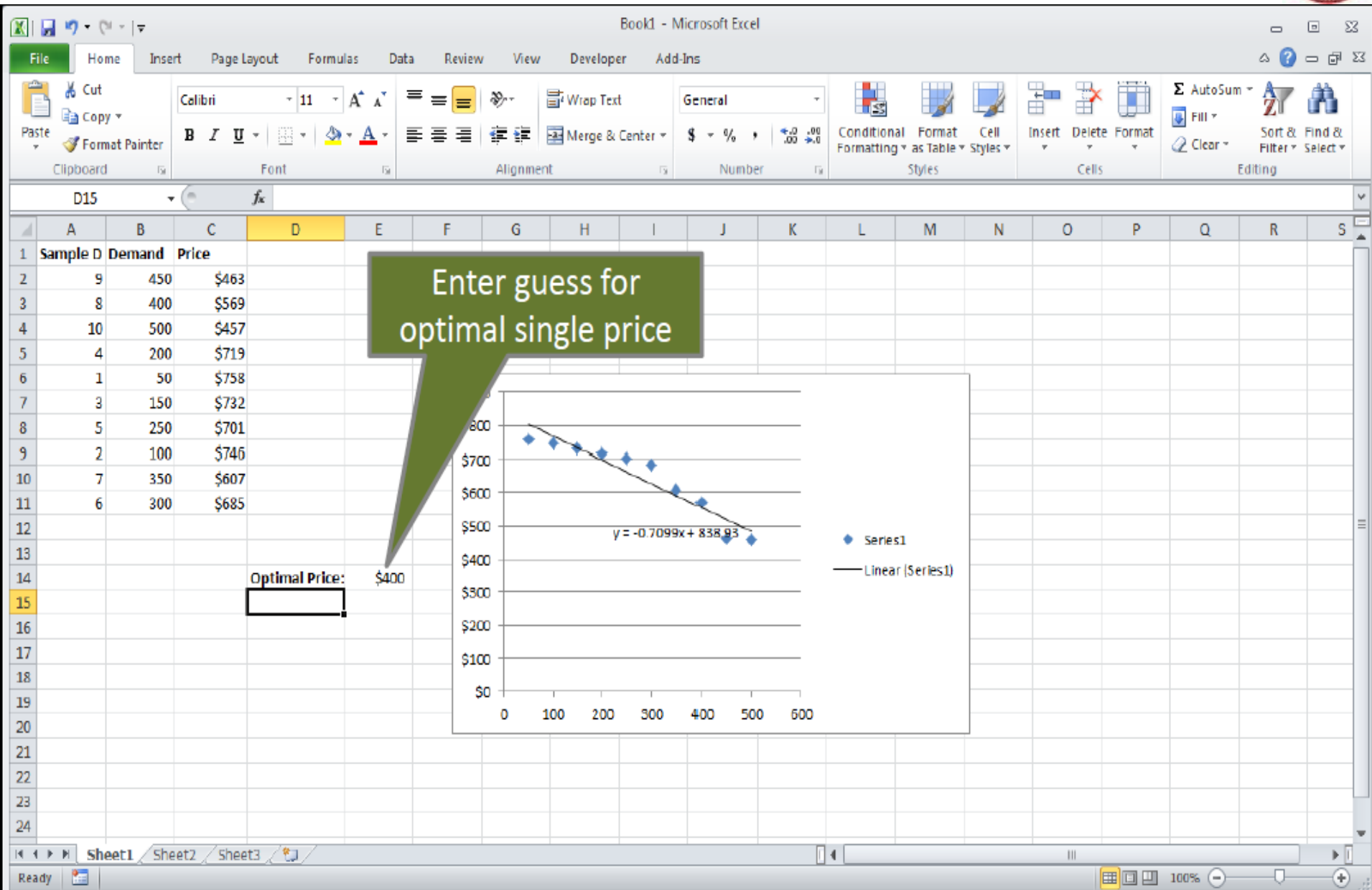
Choose "Add Trendline..."

Ready | Average: 459.35 | Count: 20 | Sum: 9187 | 100%

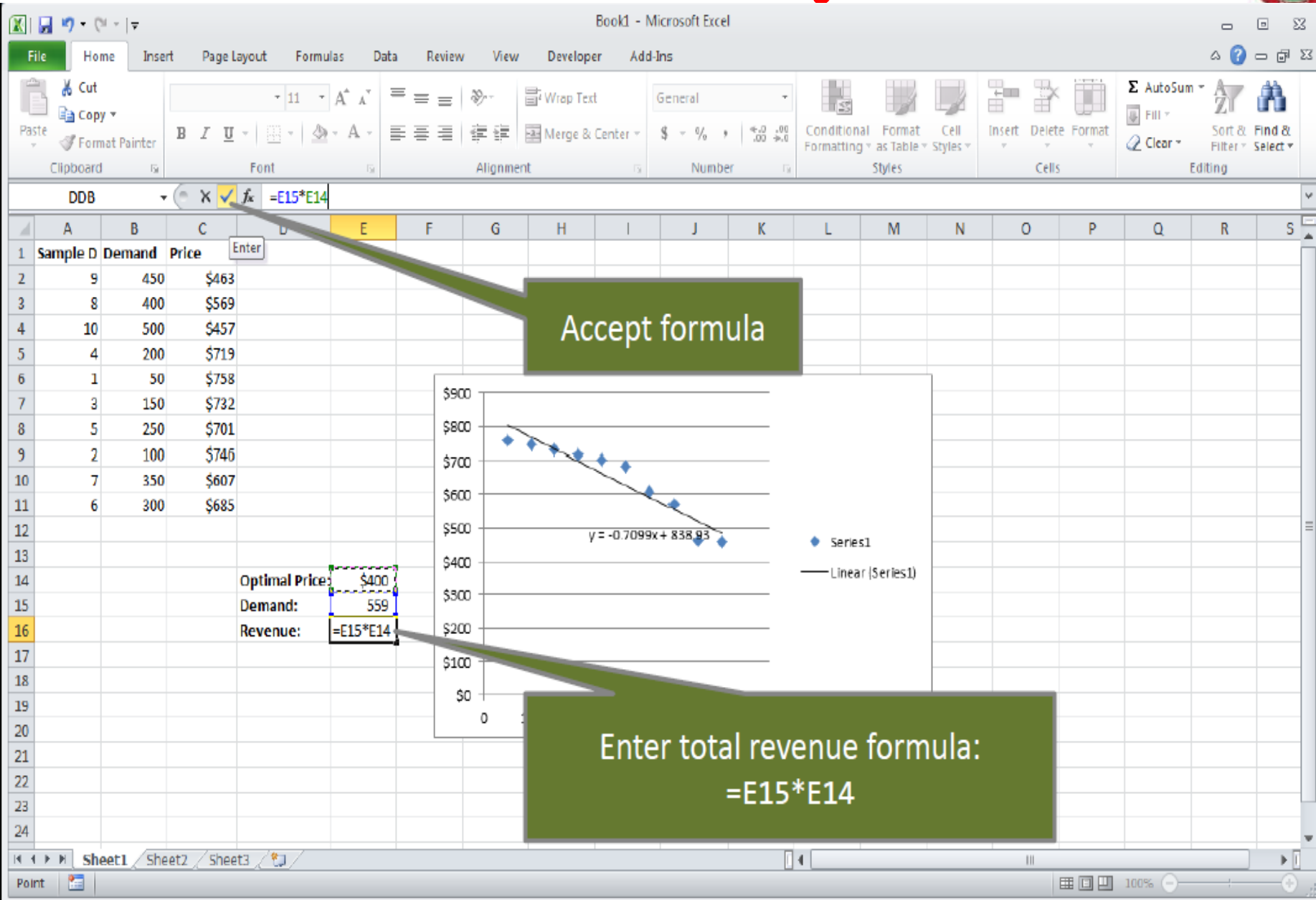
Revenue Analytics



Revenue Analytics



Revenue Analytics



Revenue Analytics

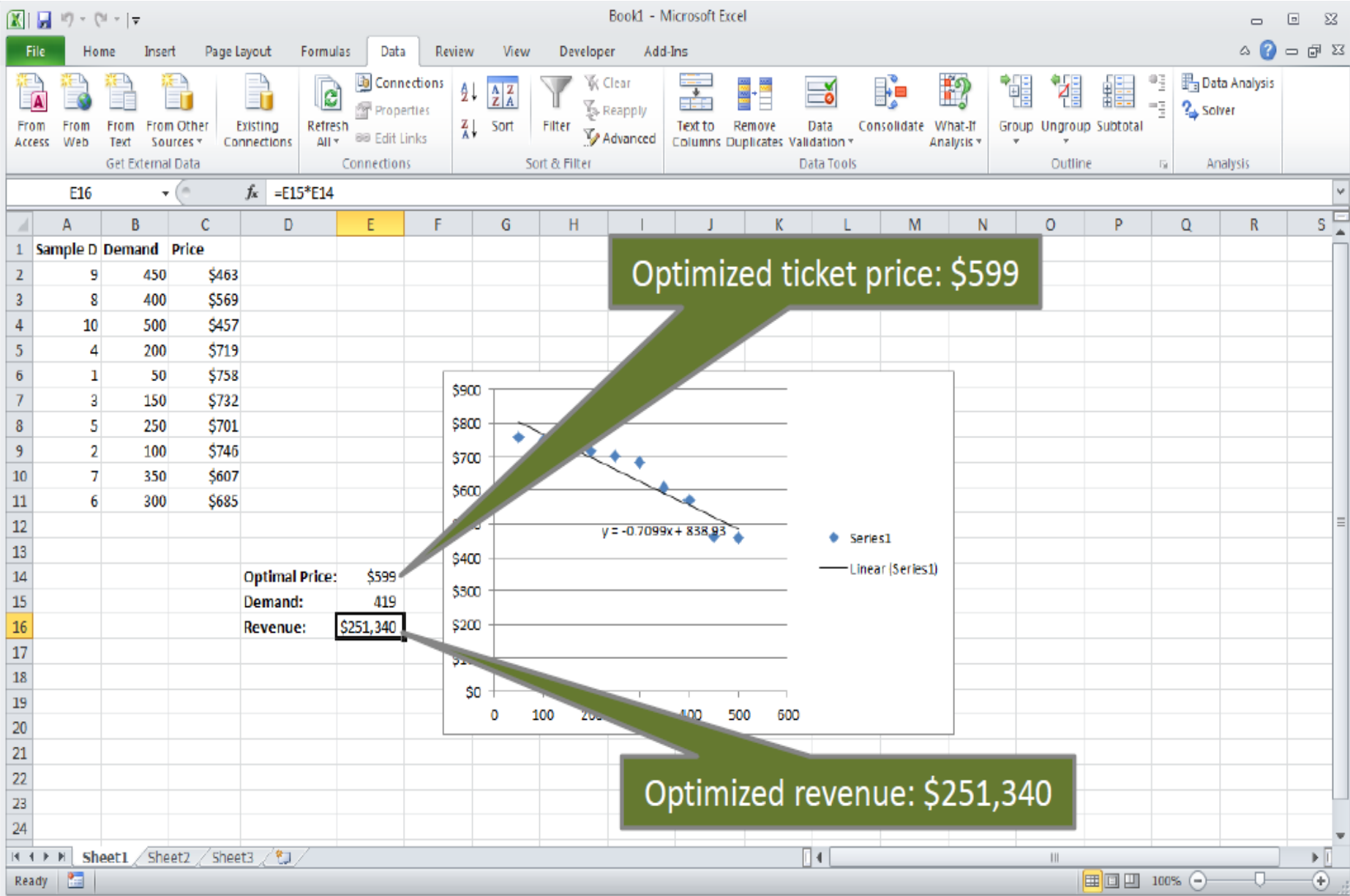


The screenshot shows the Solver Parameters dialog box in Microsoft Excel. The 'Set Objective' field is set to $\$E\16 , which is labeled as 'Revenue'. The 'To:' options are set to 'Max', which is labeled as 'Maximize'. The 'By Changing Variable Cells' field is set to $\$E\14 , which is labeled as 'Ticket Price'. The 'Solving Method' dropdown is set to 'GRG Nonlinear', which is labeled as 'Choose GRG Nonlinear solving method'. The 'Solve' button is highlighted and labeled as 'Click "Solve"'. The background spreadsheet shows a table with columns 'Sample D', 'Demand', and 'Price'.

Sample D	Demand	Price
9	450	\$463
8	400	\$569
10	500	\$457
4	200	\$719
1		
3		
5		
2		
7		
6	300	\$685

Optimal Price: $\$223$
Demand: $\$223$
Revenue: $\$223$

Revenue Analytics



Yield Management

- Goal: charge a set of customers more for the same product to increase revenue
- Ideal (from the airline's perspective): charge rich people and desperate people more money
- Doing that's illegal (at least in US and EU) – discrimination
- Legal method: yield management

Revenue Analytics



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Low Price:	\$400																
2	High Price:	\$600																
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

DDB X ✓ $=838.9-0.7*B2$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Low Price:	\$400	Enter															
2	High Price:	\$600																
3																		
4	Low Demand:	558.9																
5	High Demand:	-0.7*B2																
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		

Accept formula

Enter high price demand formula:
 $=838.9-0.7*B2$

Point

Sheet1 sheet2 Sheet3

100%

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

DDB X ✓ $=B4*B1$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Low Price:	\$400	Enter															
2	High Price:	\$600																
3																		
4	Low Demand:	140																
5	High Demand:	419																
6																		
7	Low Revenue:	$=B4*B1$																
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		

Accept formula

Enter low price revenue formula:
 $=B4*B1$

Sheet1 Sheet2 Sheet3

Point 100%

Revenue Analytics



The screenshot shows a Microsoft Excel spreadsheet titled "Book1 - Microsoft Excel". The ribbon includes File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, and Add-Ins. The spreadsheet data is as follows:

	A	B	C	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Low Price:	\$400	Enter														
2	High Price:	\$600															
3																	
4	Low Demand:	140															
5	High Demand:	419															
6																	
7	Low Revenue:	\$56,000															
8	High Revenue:	=B5*B2															

Annotations in the image:

- A green box labeled "Accept formula" points to the formula bar showing $=B5*B2$.
- A larger green box labeled "Enter high price revenue formula: $=B5*B2$ " points to cell B8.

Revenue Analytics



The screenshot shows a Microsoft Excel spreadsheet titled "Book1 - Microsoft Excel". The ribbon includes File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, and Add-Ins. The Home ribbon is active, showing options for Clipboard, Font, Alignment, Number, Styles, Cells, and Editing. The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Low Price:	\$400	Enter															
2	High Price:	\$600																
3																		
4	Low Demand:	140																
5	High Demand:	419																
6																		
7	Low Revenue:	\$56,000																
8	High Revenue:	\$251,340																
9																		
10	Total Revenue:	=SUM(B7:B8)																
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		

Callout 1: "Accept formula" points to the checkmark icon in the formula bar.

Callout 2: "Enter revenue summing formula: =SUM(B7:B8)" points to the formula entry in cell B10.

Revenue Analytics



The screenshot displays the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Low Price:	\$400														
2	High Price:	\$600														
3																
4	Low Demand:	140														
5	High Demand:	419														
6																
7	Low Revenue:	\$56,000														
8	High Revenue:	\$251,340														
9																
10	Total Revenue:	\$307,340														
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																

The formula bar shows the formula for cell B10: $=SUM(B7:B8)$.

The Solver tool is highlighted in the Data Analysis ribbon, and a tooltip is visible. A large green arrow points from the Solver button to a green box containing the text "Launch Excel's Solver tool".

Revenue Analytics



The image shows a screenshot of the Microsoft Excel Solver Parameters dialog box. The background spreadsheet contains the following data:

	A	B	C	D
1	Low Price:	\$400		
2	High Price:	\$600		
3				
4	Low Demand:	140		
5	High Demand:	419		
6				
7	Low Revenue			
8	High Revenue			
9				
10	Total Revenue			

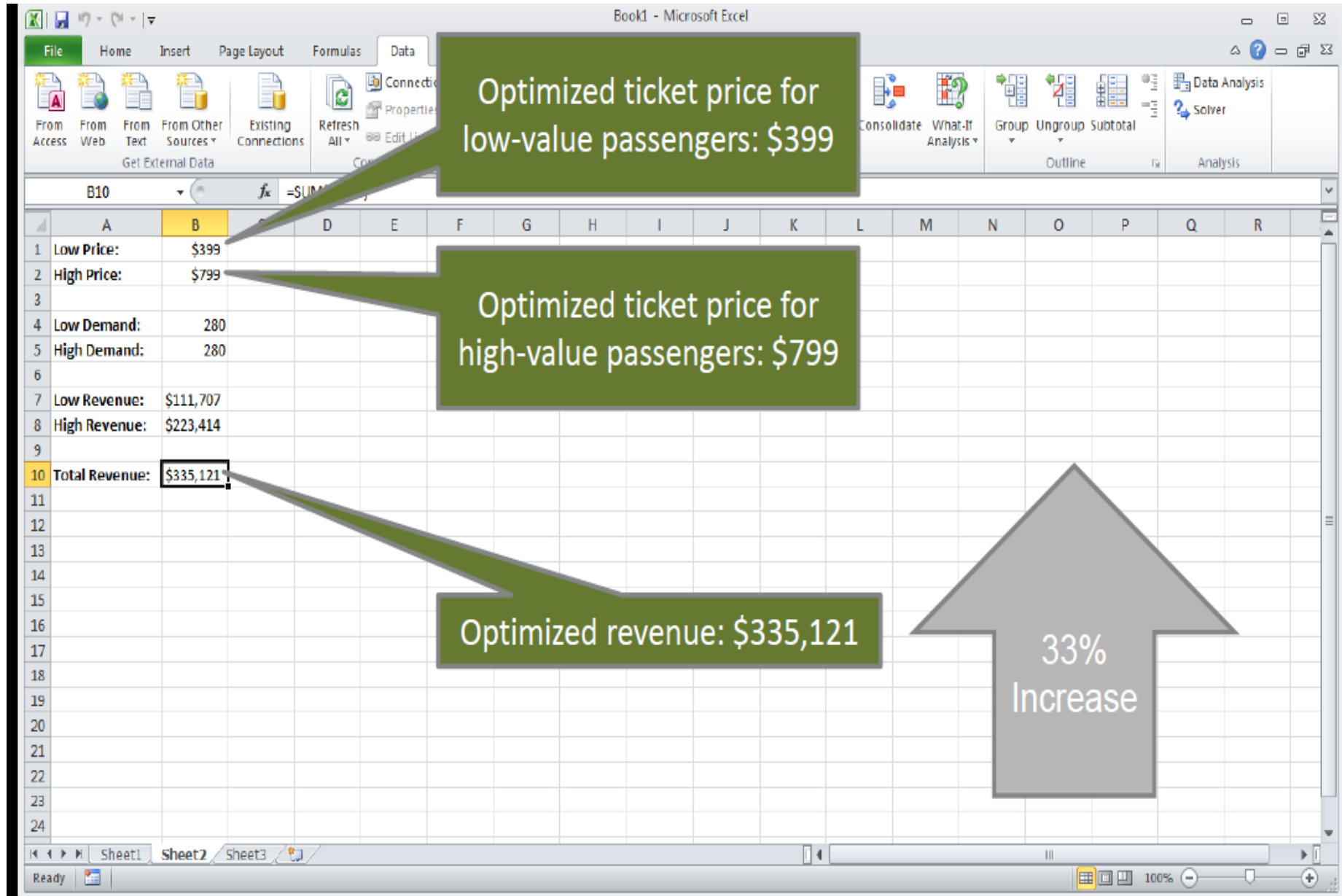
The Solver Parameters dialog box is configured as follows:

- Set Objective: $\$B\10
- To: Max Min Value Of: 0
- By Changing Variable Cells: $\$B\$1:\$B\2
- Subject to the Constraints: (empty list)
- Make Unconstrained Variables Non-Negative
- Select a Solving Method: GRG Nonlinear
- Solving Method: Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.
- Buttons: Add, Change, Delete, Reset All, Load/Save, Options, Help, Solve, Load/Save

Callouts in the image point to the following elements:

- Maximize**: Points to the 'Max' radio button in the 'To:' section.
- Total Revenue**: Points to the objective cell reference $\$B\10 .
- Ticket Prices**: Points to the variable cells reference $\$B\$1:\$B\2 .
- Choose GRG Nonlinear solving method**: Points to the 'GRG Nonlinear' dropdown menu.
- Click "Solve"**: Points to the 'Solve' button.

Revenue Analytics

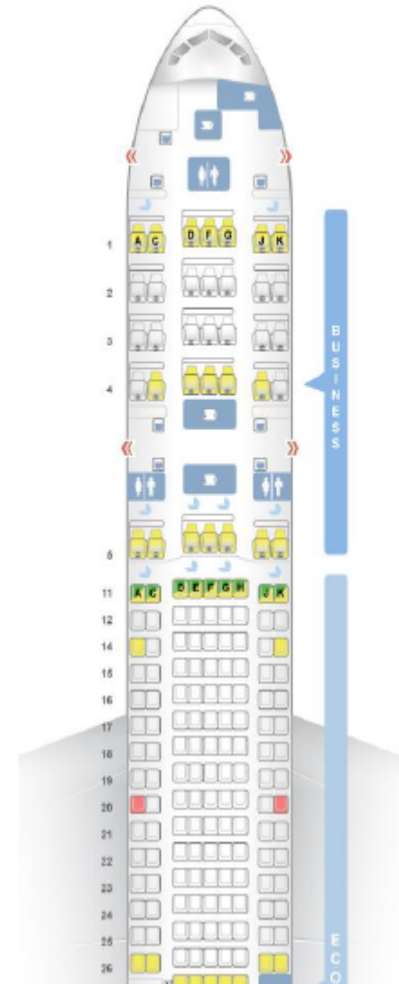


Revenue Analytics



Capacity Constraints

- Current model assumes an unlimited number of seats on airplane
- Need to add a capacity constraint to accurately model pricing
- Aircraft (Boeing 777) holds 341 passengers



Revenue Analytics



The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Low Price:	\$399	Enter															
2	High Price:	\$799																
3																		
4	Low Demand:	280	PAX:	=B4+B5														
5	High Demand:	280																
6																		
7	Low Revenue:	\$111,707																
8	High Revenue:	\$223,414																
9																		
10	Total Revenue:	\$335,121																

The formula bar at the top shows the formula $=B4+B5$ being entered into cell E4. A green callout box with the text "Accept formula" points to the formula bar. Another green callout box with the text "Enter total # passengers formula: =B4+B5" points to the formula in cell E4.

Revenue Analytics



The screenshot displays the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Low Price:	\$399														
2	High Price:	\$799														
3																
4	Low Demand:	280		PAX:	559											
5	High Demand:	280														
6																
7	Low Revenue:	\$111,707														
8	High Revenue:	\$223,414														
9																
10	Total Revenue:	\$335,121														
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																

The Solver tool is highlighted in the Data Analysis ribbon, with a tooltip explaining its function: "What-if analysis tool that find optimal value of a target cell by changing values in cells used to calculate the target cell." Below the tooltip, it says "SOLVER.XLAM Press F1 for add-in help."

A large green arrow points from the Solver tool to a green box containing the text: "Restart Excel's Solver tool"

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Connections Refresh All

From Access From Web From Text From Other Sources Existing Connections

Get External Data

fx =B4+B5

	A	B	C	D
1	Low Price:	\$399		
2	High Price:	\$799		
3				
4	Low Demand:	280	PAX:	
5	High Demand:	280		
6				
7	Low Revenue:	\$111,707		
8	High Revenue:	\$223,414		
9				
10	Total Revenue:	\$335,121		
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Solver Parameters

Set Objective:

To: Max Min Value Of:

By Changing Variable Cells:

Subject to the Constraints:

Make Unconstrained Variables Non-Negative

Select a Solving Method:

Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Click Add button

Sheet1 Sheet2 Sheet3

Enter

100%

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Existing Connections Refresh All Connections Properties Edit Links

Connections

Less than/equal to

Data Validation Consolidate What-If Analysis Group Ungroup Subtotal Outline Analysis

Data Analysis Solver

fx =B4*B5

	A	B	C	D	E	F	G	H	I	K	L	R
1	Low Price:	\$399										
2	High Price:	\$799										
3												
4	Low Demand:	280		PAX:	559							
5	High Demand:	280										
6												
7	Low Revenue:	\$111,707										
8	High Revenue:	\$223,414										
9												
10	Total Revenue:	\$335,121										
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												

Add Constraint

Cell References: \$E\$4

Constraint: <= 341

OK Add Cancel

Total passengers

Aircraft capacity: 341

Click OK

Sheet1 Sheet2 Sheet3

Enter

100%

Revenue Analytics



The screenshot shows the Microsoft Excel Solver Parameters dialog box. The spreadsheet in the background contains the following data:

	A	B	C	D
1	Low Price:	\$399		
2	High Price:	\$799		
3				
4	Low Demand:	280	PAX:	
5	High Demand:	280		
6				
7	Low Revenue:	\$111,707		
8	High Revenue:	\$223,414		
9				
10	Total Revenue:	\$335,121		

The Solver Parameters dialog box is configured as follows:

- Set Objective: $\$D\10
- To: Max Min Value Of: 0
- By Changing Variable Cells: $\$B\$1:\$B\2
- Subject to the Constraints: $\$E\$4 \leq 341$
- Make Unconstrained Variables Non-Negative
- Select a Solving Method: GRG Nonlinear
- Solving Method: Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

A green callout box with a white border and a pointer to the 'Solve' button contains the text: "Click Solve button".

Revenue Analytics



Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Add-Ins

From Access From Web From Text From Other Sources Existing Connections Refresh All Properties Edit Links Connections Sort & Filter Filter Clear Reapply Advanced Text to Columns Remove Duplicates Data Validation Consolidate What-If Analysis Group Ungroup Subtotal Data Analysis Solver

fx =B4+B5

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	Low Price:	\$711																	
2	High Price:	\$955																	
3																			
4	Low Demand:	171		PAX:	341														
5	High Demand:	171																	
6																			
7	Low Revenue:	\$121,274																	
8	High Revenue:	\$162,803																	
9																			
10	Total Revenue:	\$284,077																	
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			

Solver Results

Solver found a solution. All Constraints and optimality conditions are satisfied.

Reports

Keep Solver Solution

Restore Original Values

Return to Solver Parameters Dialog

Outline Reports

Answer Sensitivity Limits

OK Cancel Save Scenario...

Solver found a solution. All Constraints and optimality conditions are satisfied.

When the GRG engine is used, Solver has found at least a local optimal solution. When Simplex LP is used, this means Solver has found a global optimal solution.

Click OK button

Sheet1 Sheet2 Sheet3

Ready 100%

Revenue Analytics



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	Low Price:	\$711																	
2	High Price:	\$955																	
3																			
4	Low Demand:	171		PAX:	341														
5	High Demand:	171																	
6																			
7	Low Revenue:	\$121,274																	
8	High Revenue:	\$162,803																	
9																			
10	Total Revenue:	\$284,077																	
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			

Callout 1: Optimized ticket price for low-value passengers: \$711

Callout 2: Optimized ticket price for high-value passengers: \$955



Thank you !!!