# Business Analytics

Today Objective

**Price Analytics**

# Price Analytics

- Understanding How pricing impacts revenues and profitability is one of the most important issues faced by mangers.
- To do so, mangers 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 units * $5 = **$60**

50 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

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

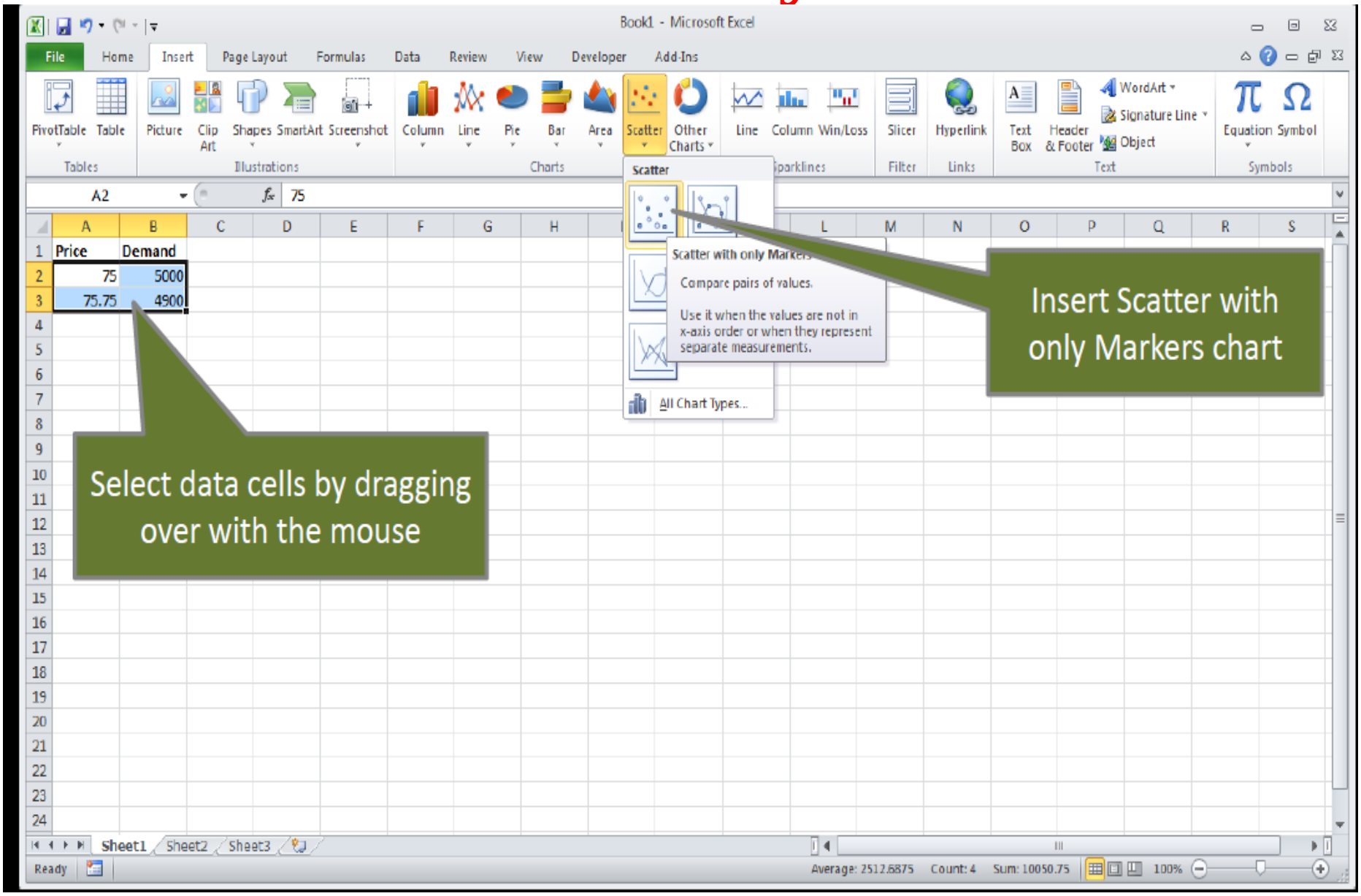
With the 1% change in prices the demand changes by 2%.

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

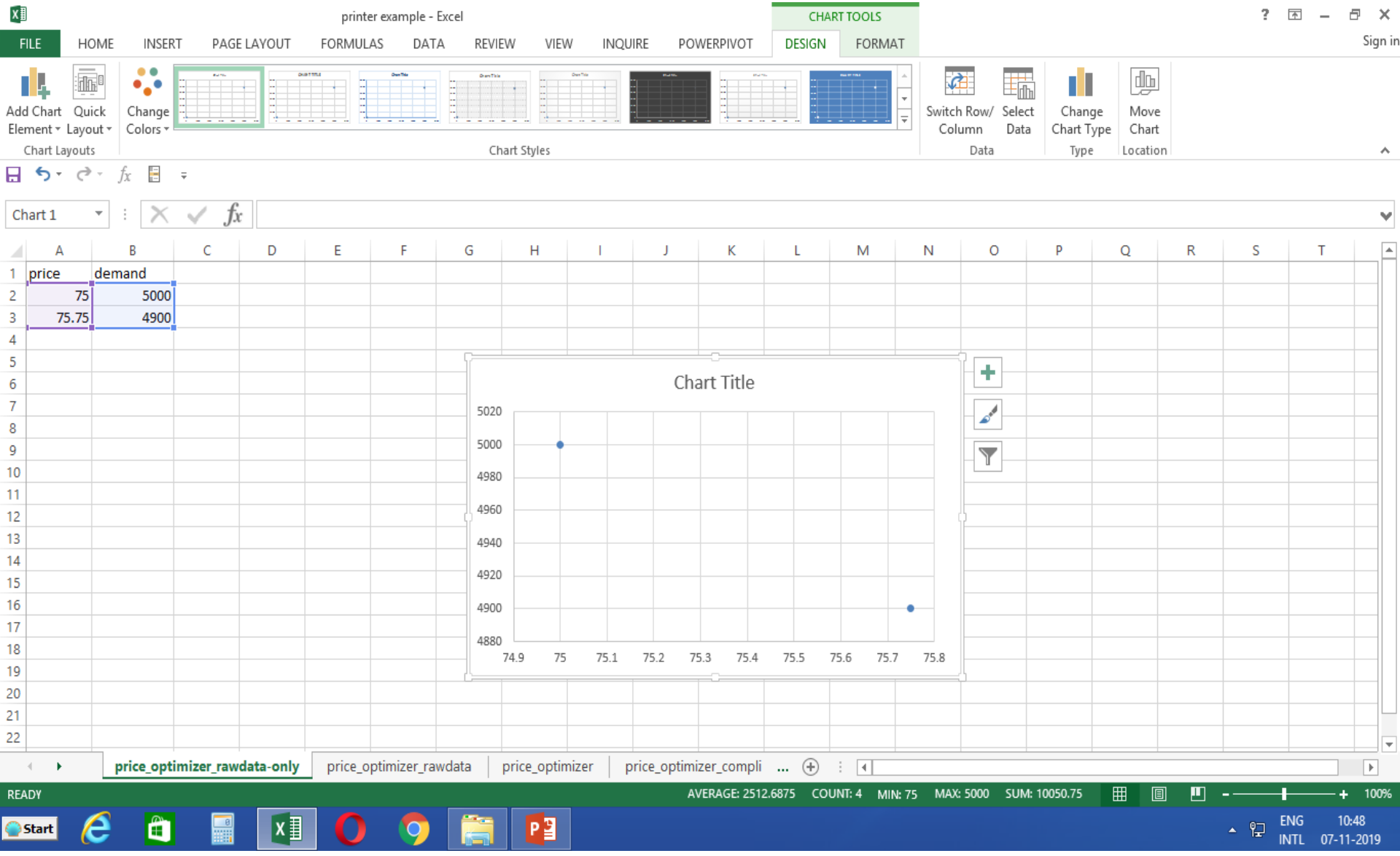
The average cost incurred in producing a printer is approximate $59

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

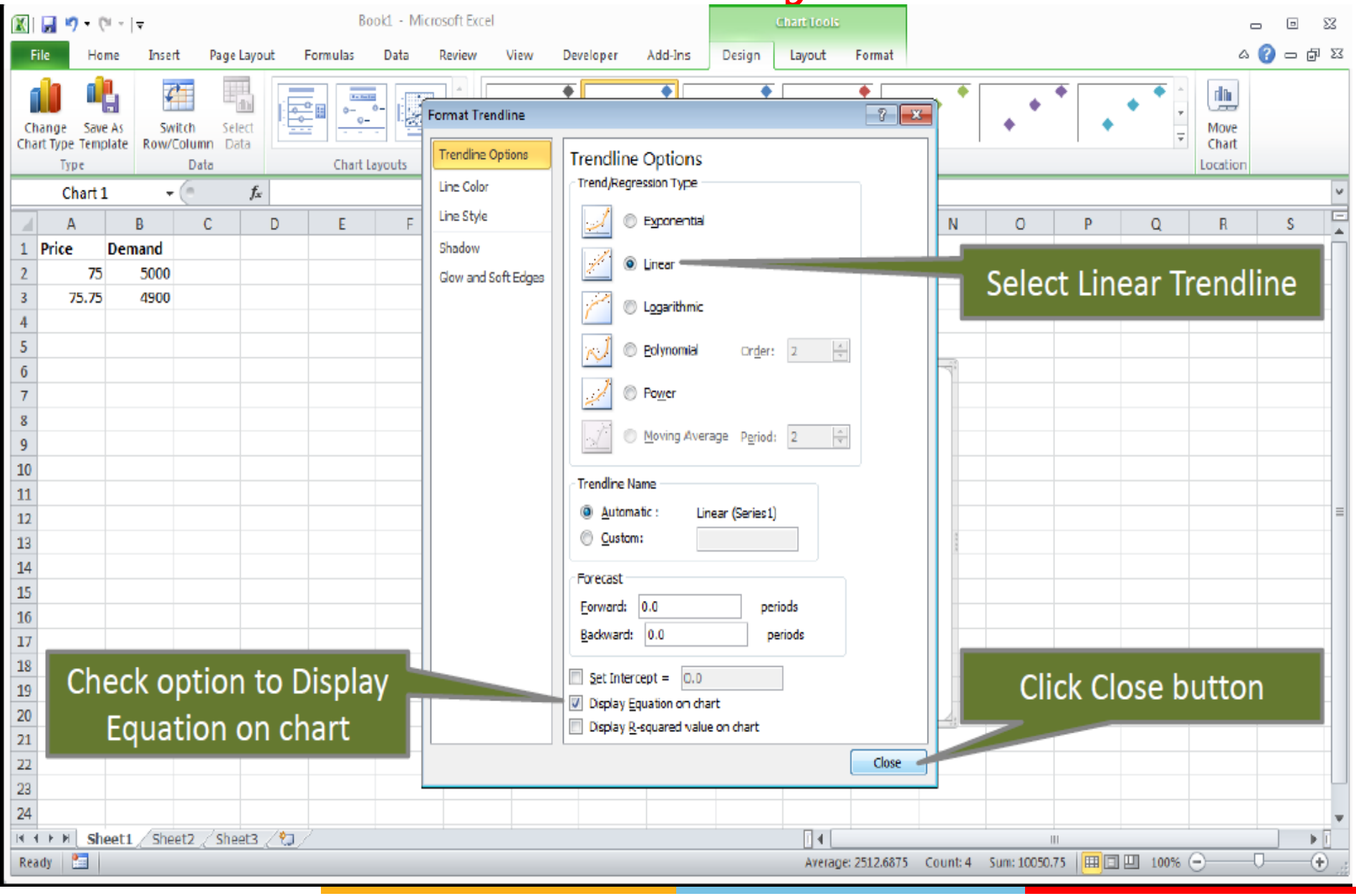
# Price Analytics



# Price Analytics



# Price Analytics



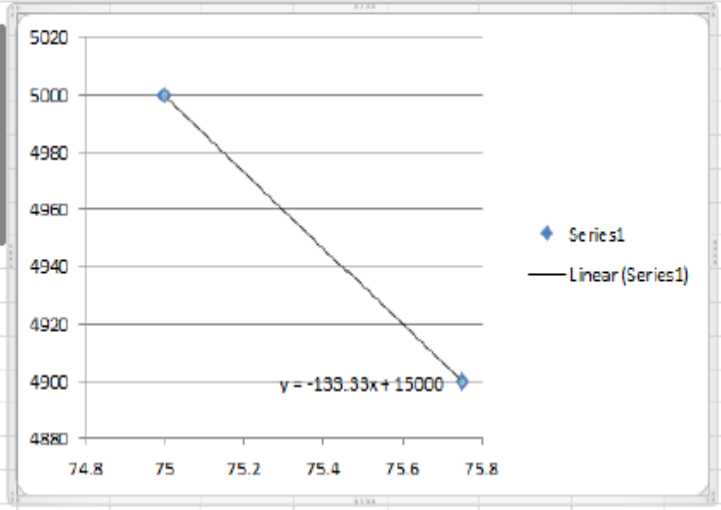
# Price Analytics

Book1 - Microsoft Excel

| | A | B |
|---|---|---|
| 1 | Price | Demand |
| 2 | 75 | 5000 |
| 3 | 75.75 | 4900 |

Demand Curve Formula:

$d = 15{,}000 - 133.33 * p$

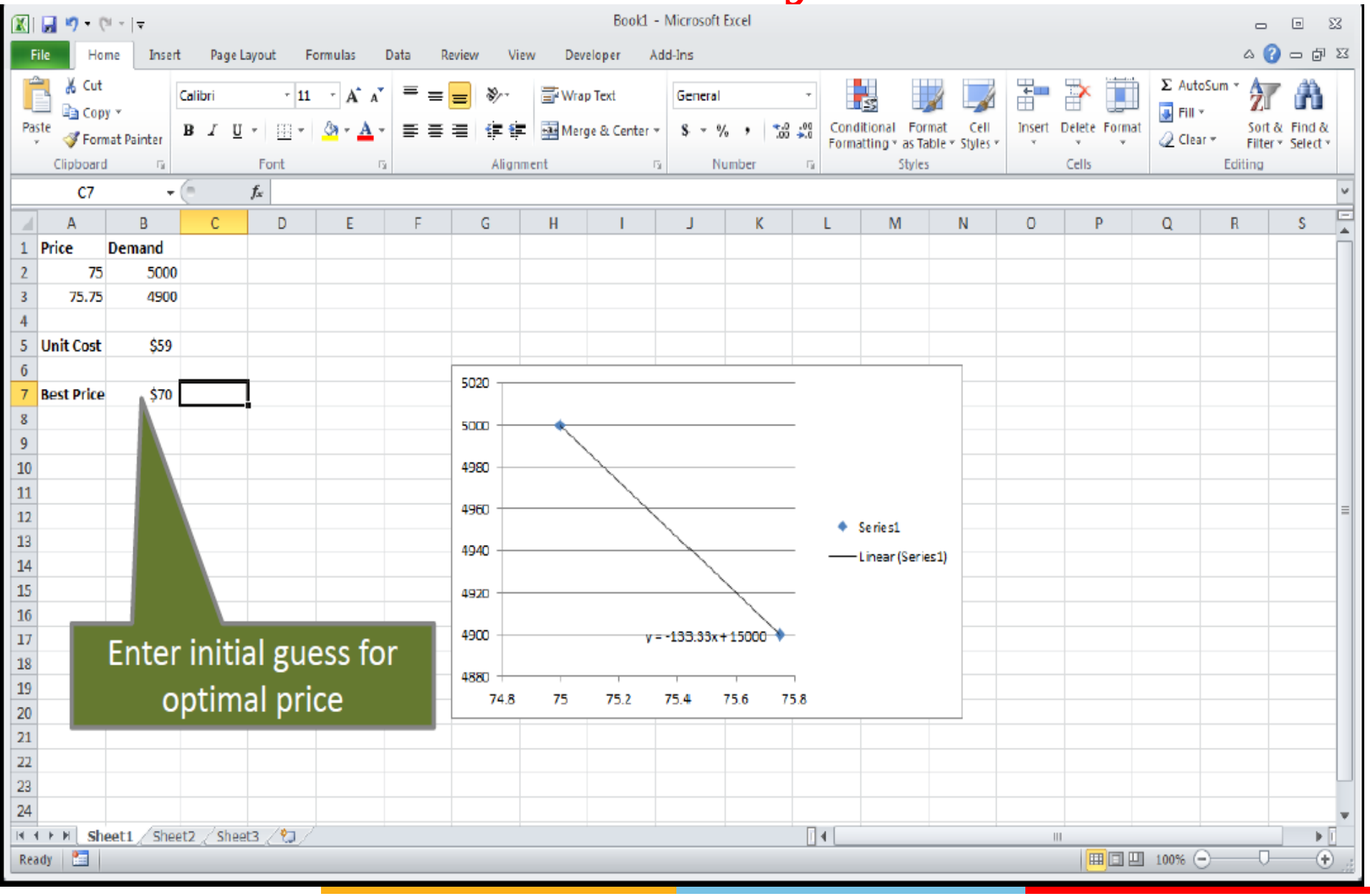



Sheet1 Sheet2 Sheet3

Ready

Average: 2512.6875 Count: 4 Sum: 10050.75 100%

# Price Analytics



# Price Analytics

Book1 - Microsoft Excel

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

Cut | Copy | Format Painter | Paste | Clipboard | Font | Alignment | Wrap Text | Merge & Center | Currency | Number | Conditional Formatting | Format as Table | Cell Styles | Styles | Insert | Delete | Format | Cells | AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

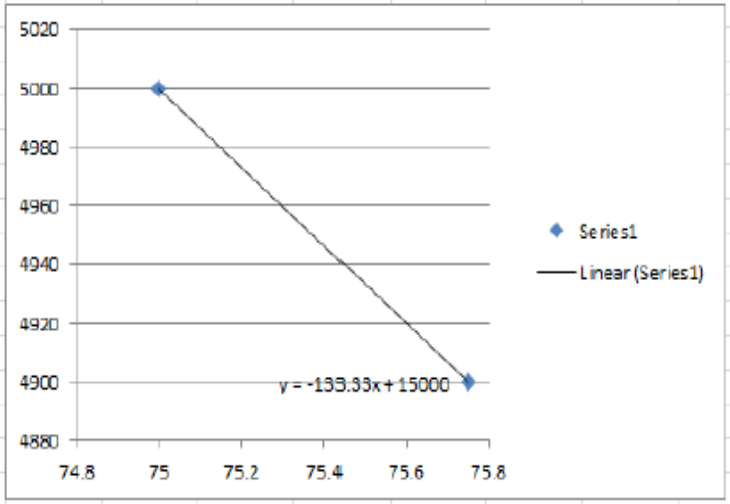
DDB | =B8*(B7-B5)

Enter

Accept formula

Total Profit = (Price – Unit Cost) * Demand

| | A | B |
|---|---|---|
| 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 | *(B7-B5) |

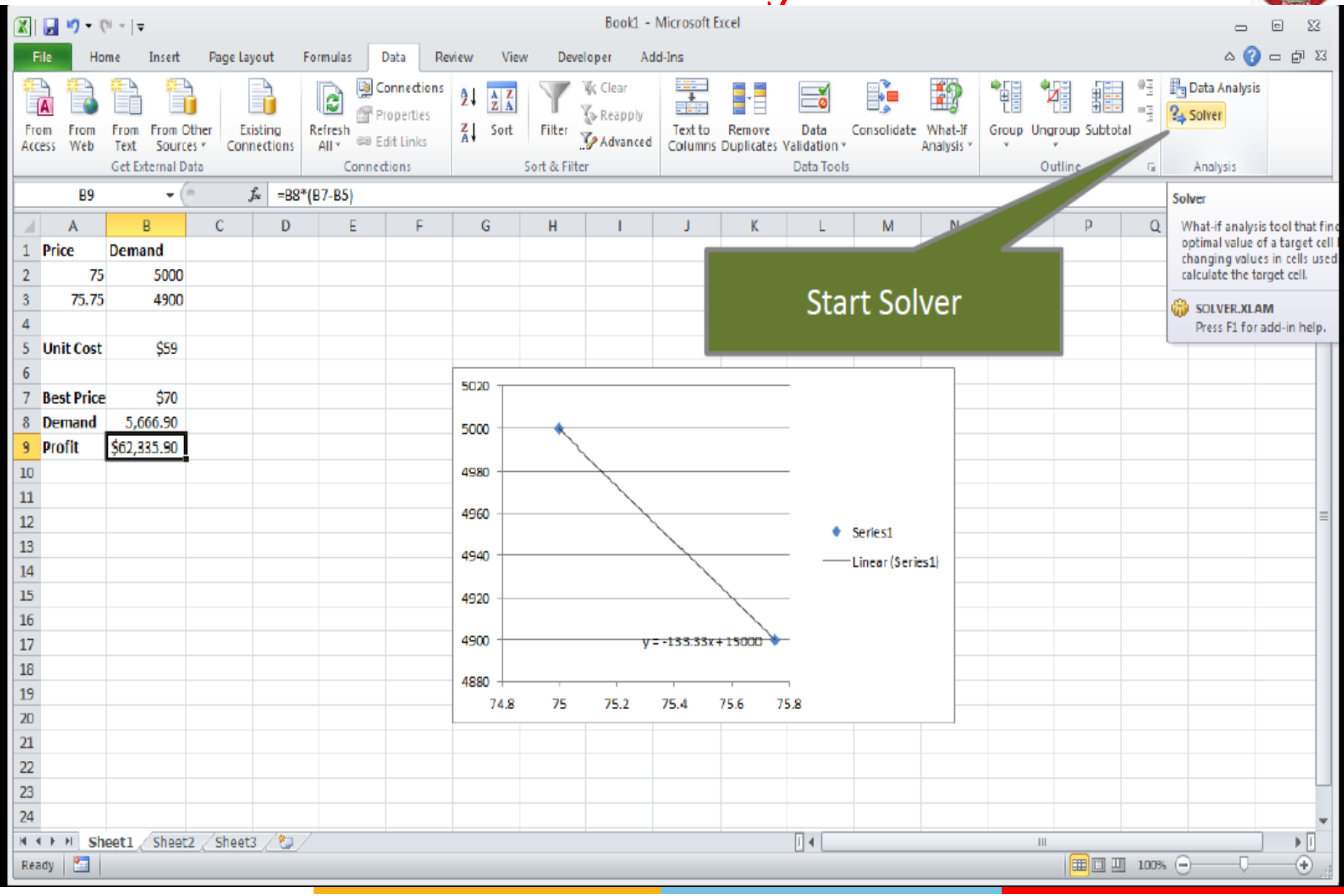



Enter profit formula:
=B8*(B7-B5)

Sheet1 | Sheet2 | Sheet3

Enter | 100%

# Price Analytics



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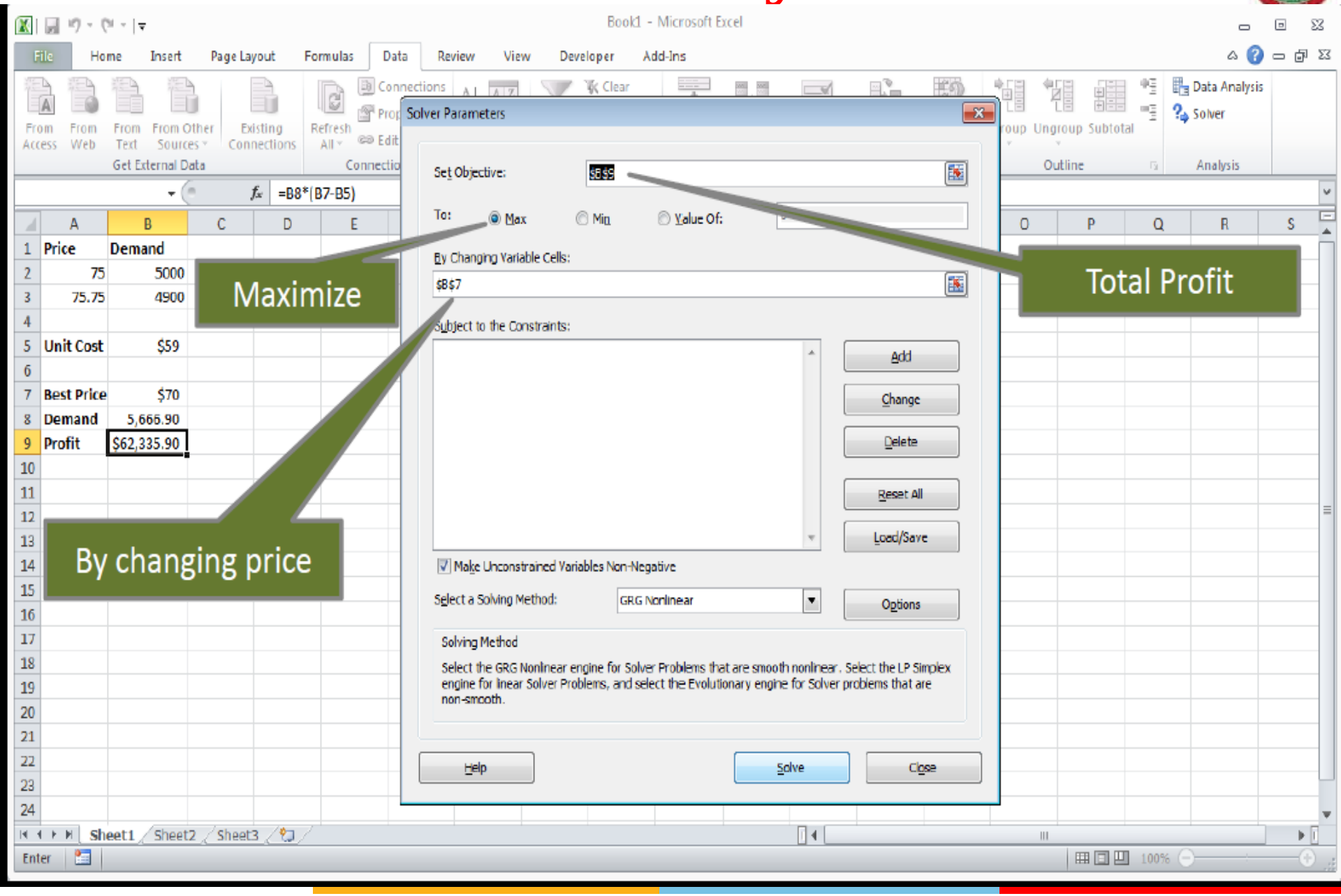
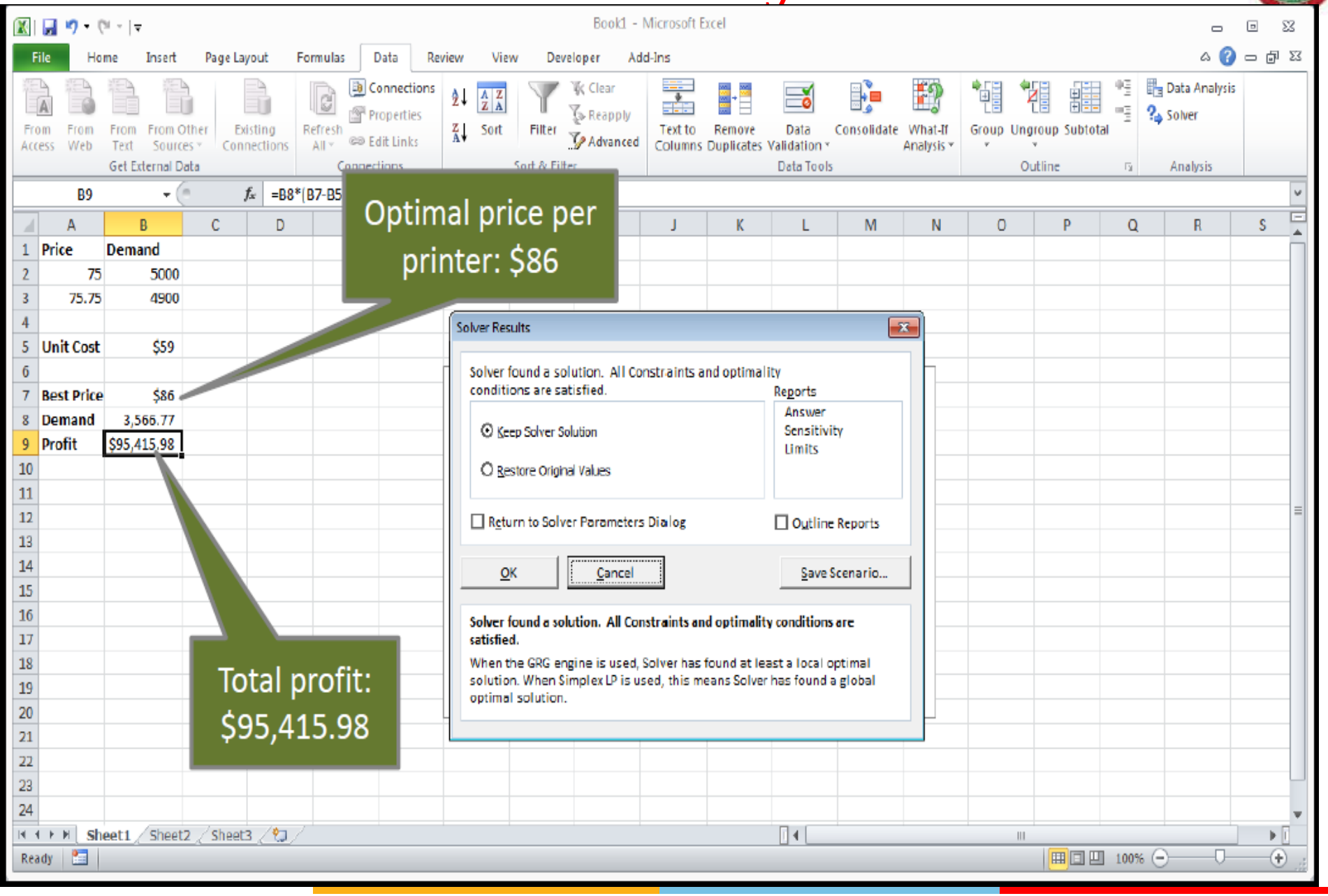



| | A | B |
|---|---|---|
| 1 | Price | Demand |
| 2 | 75 | 5000 |
| 3 | 75.75 | 4900 |
| 4 | | |
| 5 | Unit Cost | $59 |
| 6 | | |
| 7 | Best Price | $70 |
| 8 | Demand | 5,666.90 |
| 9 | Profit | $62,335.90 |

=B8*(B7-B5)

# Price Analytics



# 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 is unable to understand how the competitors can cover up the costs of production for printers

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

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

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

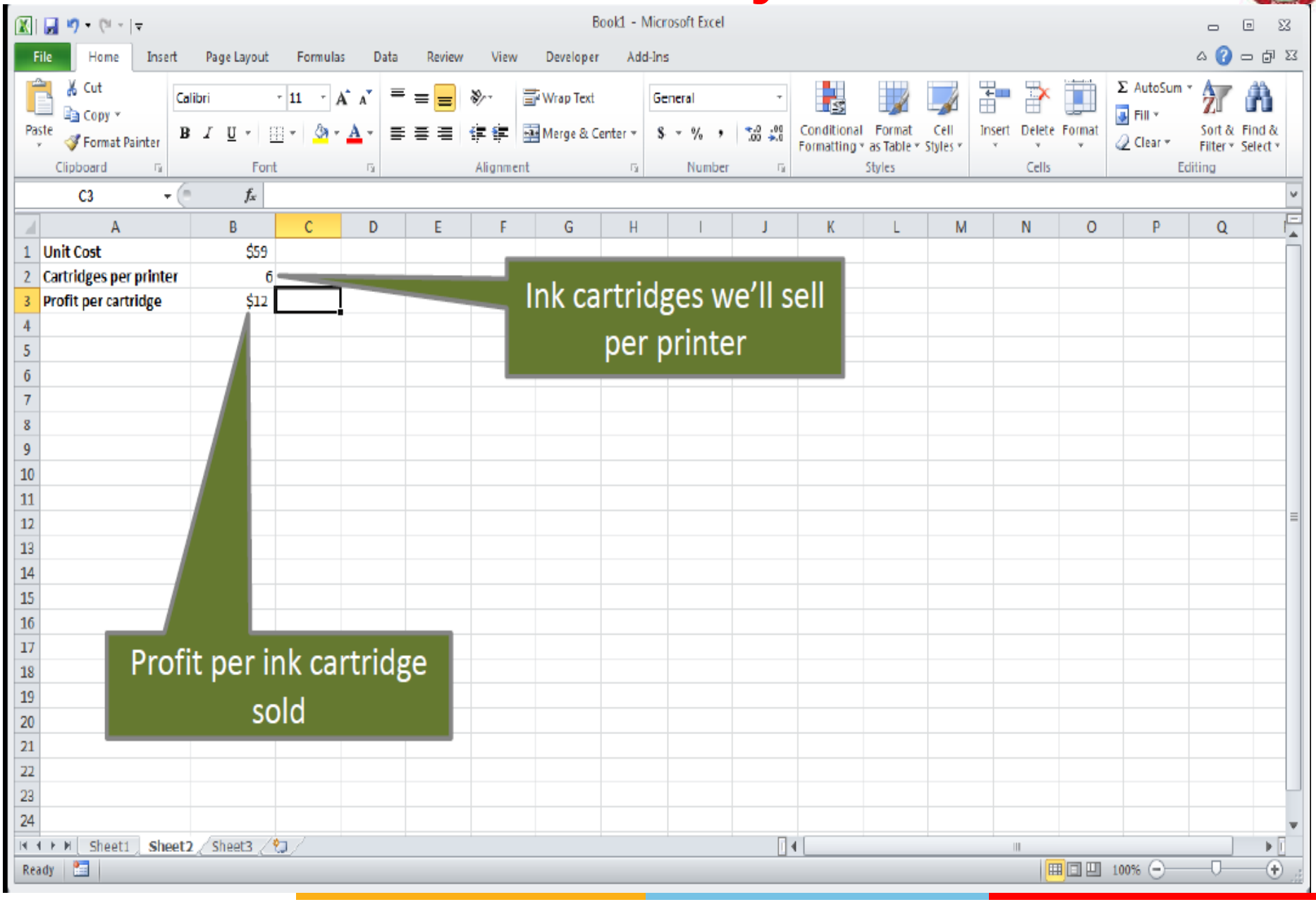
On further analysis, they found that the average lifetime of TP printers is three years while the mean lifetime of a cartridge is six months and customer buy more than one cartridge

# Price Analytics

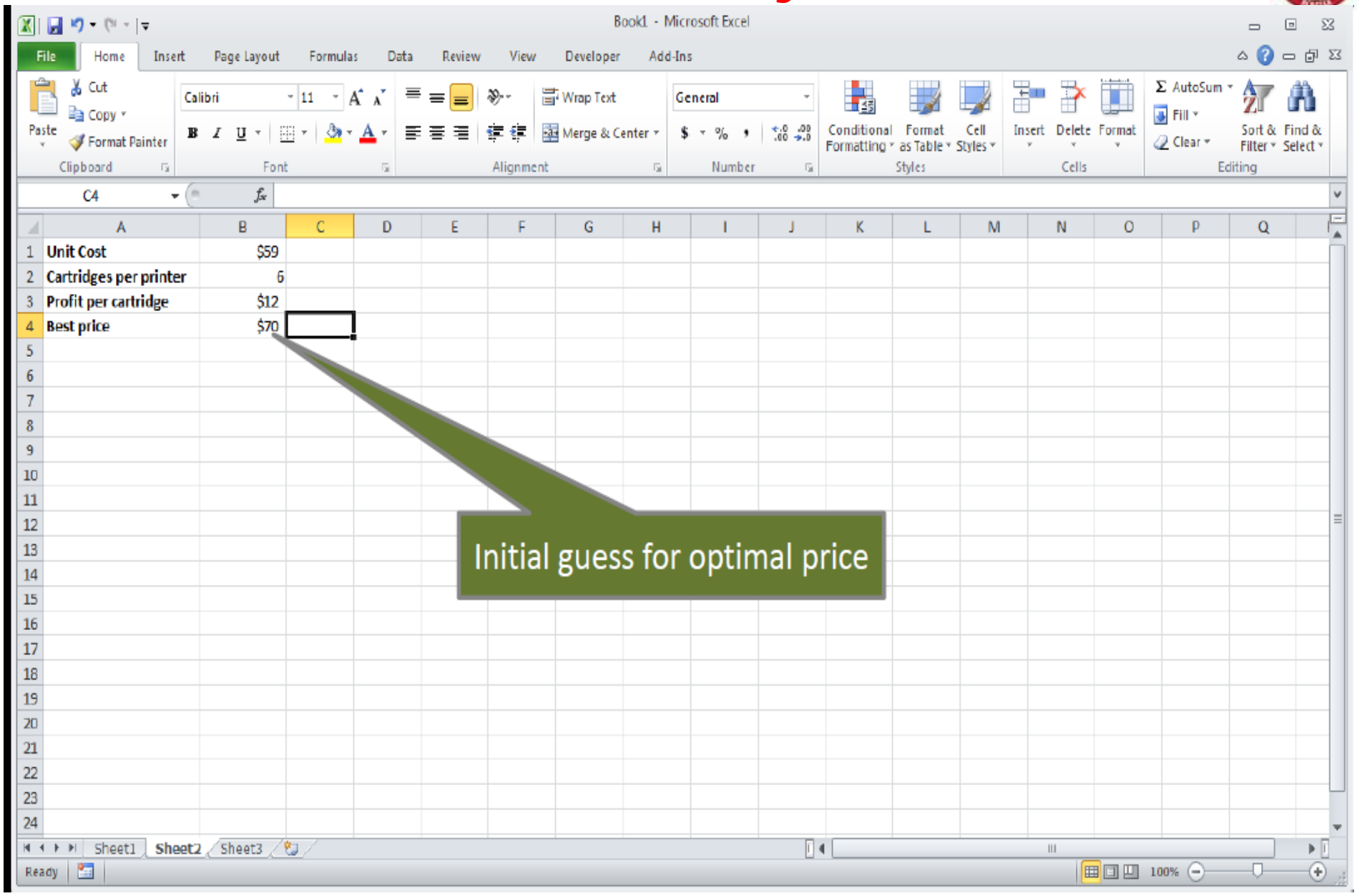
The production set up for cartridges do not require much effort and cost because the resources used are almost similar to those needed for manufacturing printers. The average cost of producing a cartridge is $4 only. It is sold at $16 per unit in the market.

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?

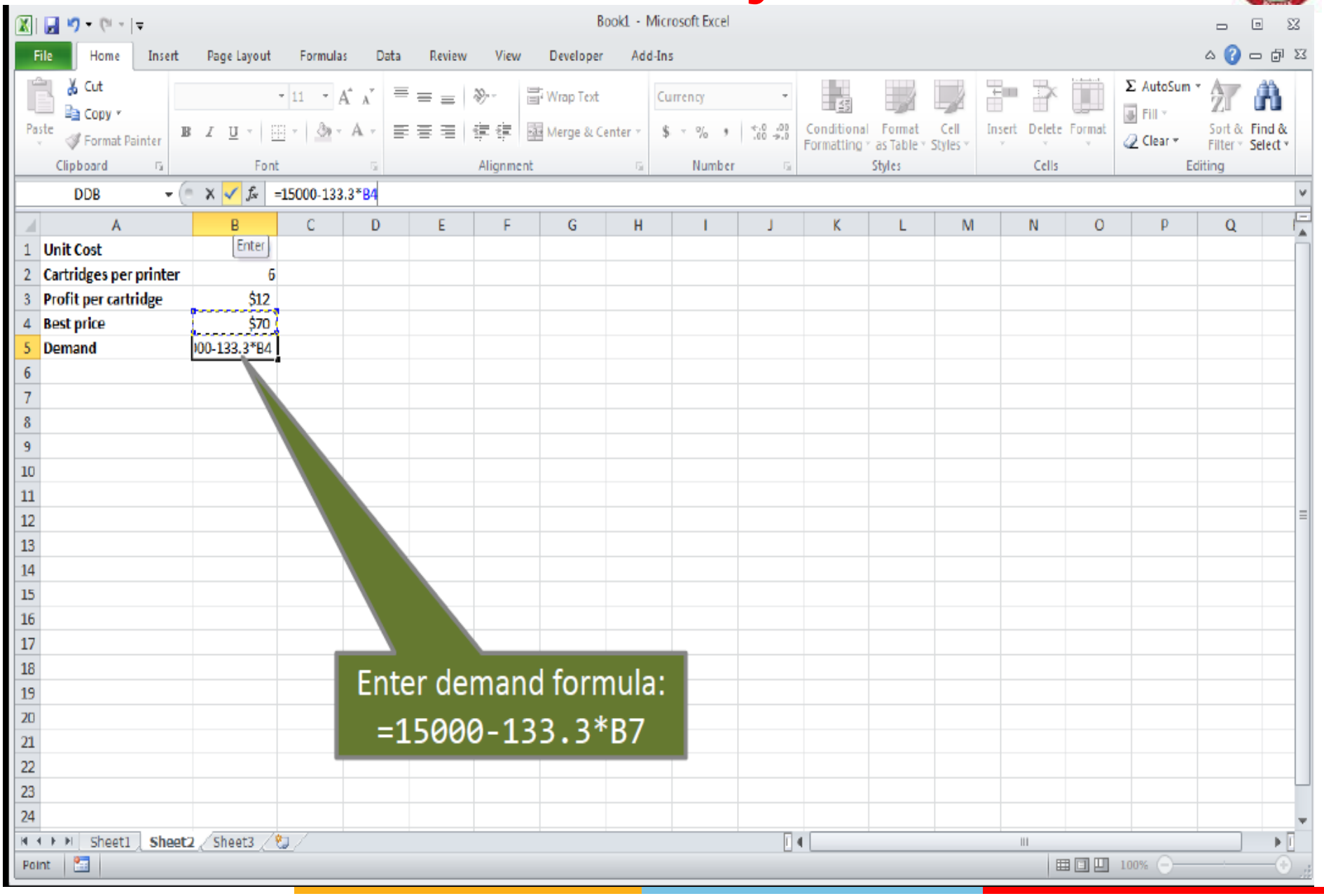
# Price Analytics



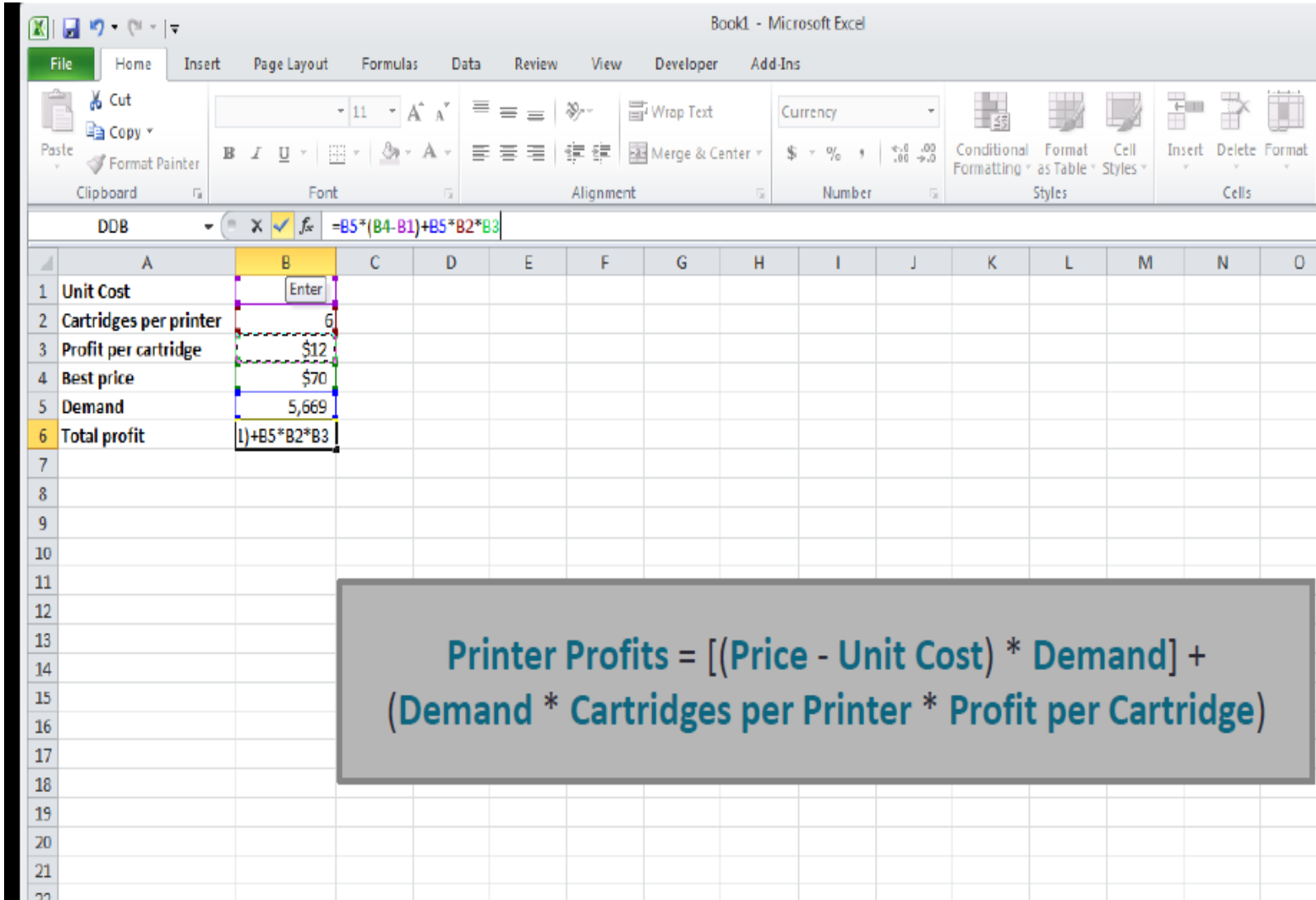
# Price Analytics



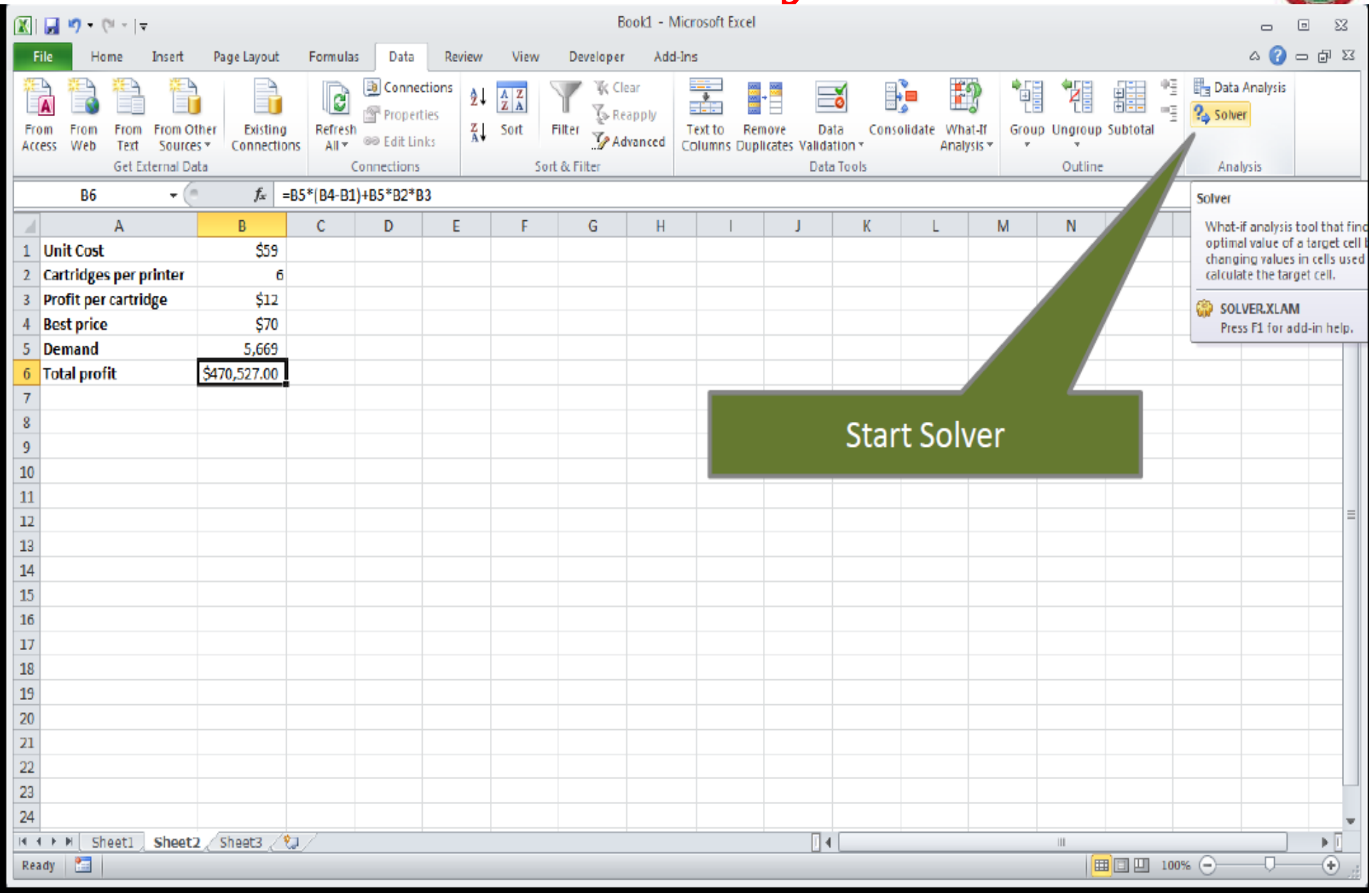
# Price Analytics



# Price Analytics

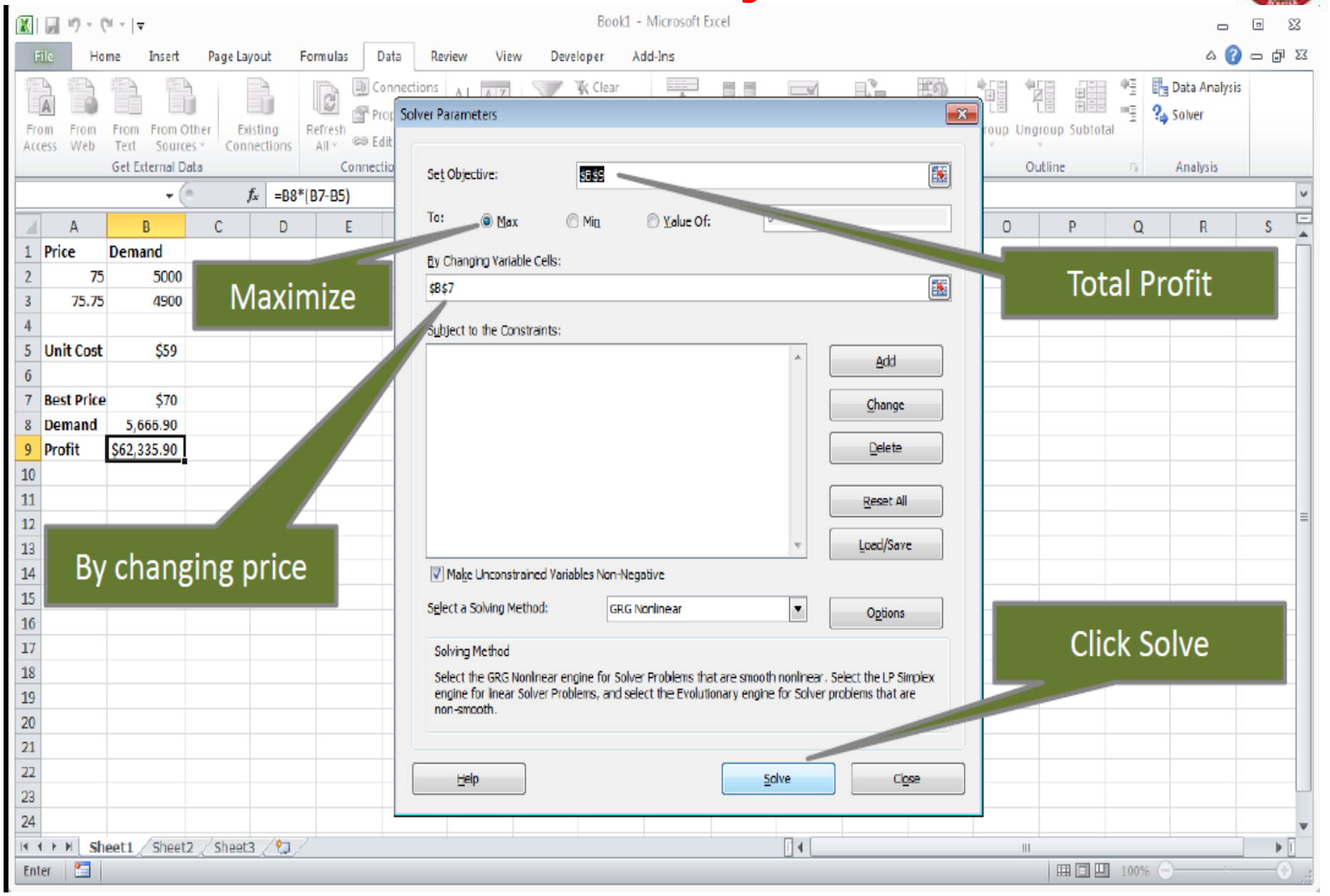


# Price Analytics

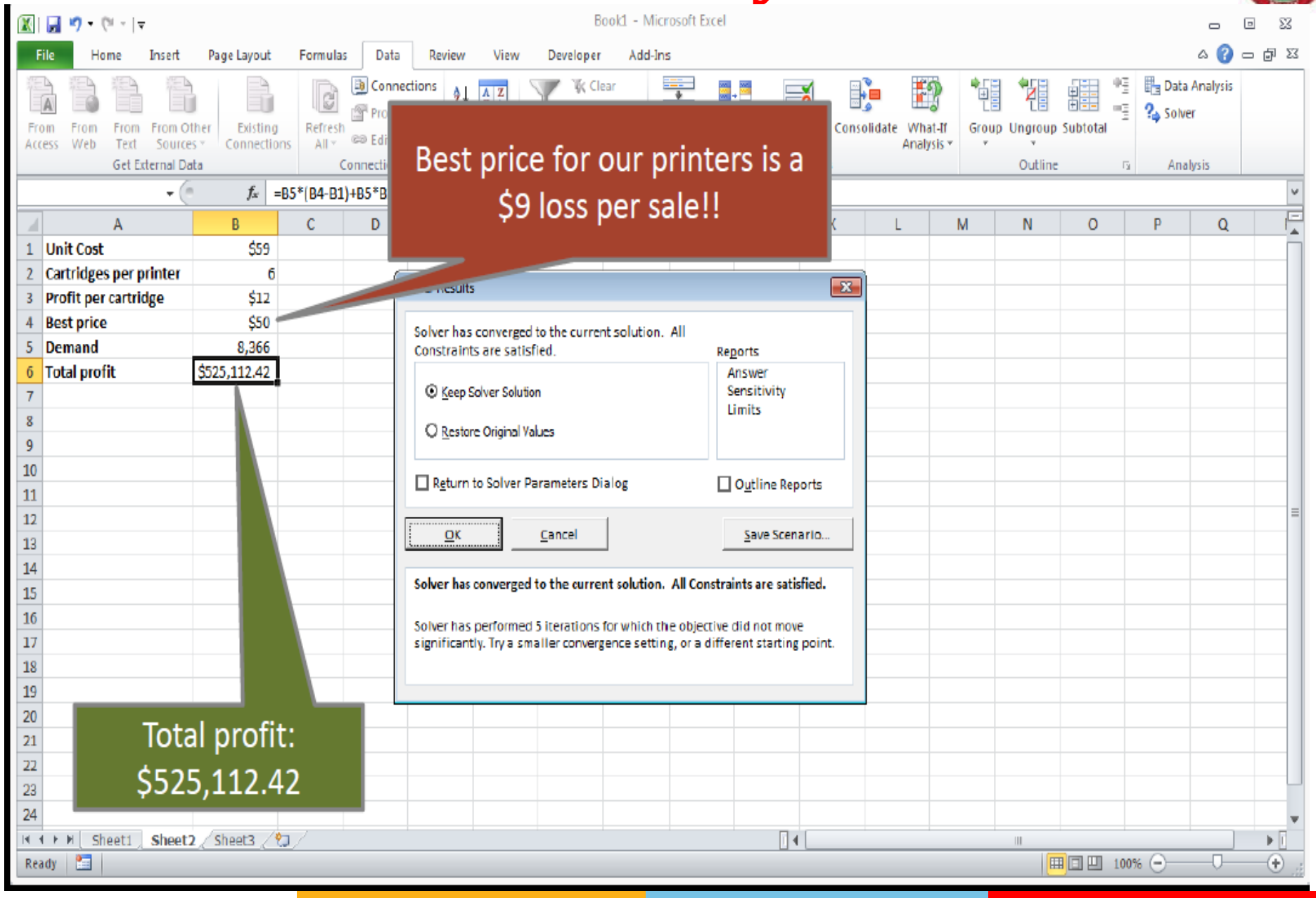



| | A | B |
|---|---|---|
| 1 | Unit Cost | $59 |
| 2 | Cartridges per printer | 6 |
| 3 | Profit per cartridge | $12 |
| 4 | Best price | $70 |
| 5 | Demand | 5,669 |
| 6 | Total profit | $470,527.00 |

# Price Analytics



# Price Analytics



# 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..**

**Demand = $a(price)^2 + b(price) + c$**

**Example:**

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

**The store is considering charging from $1.50-$2.50for 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

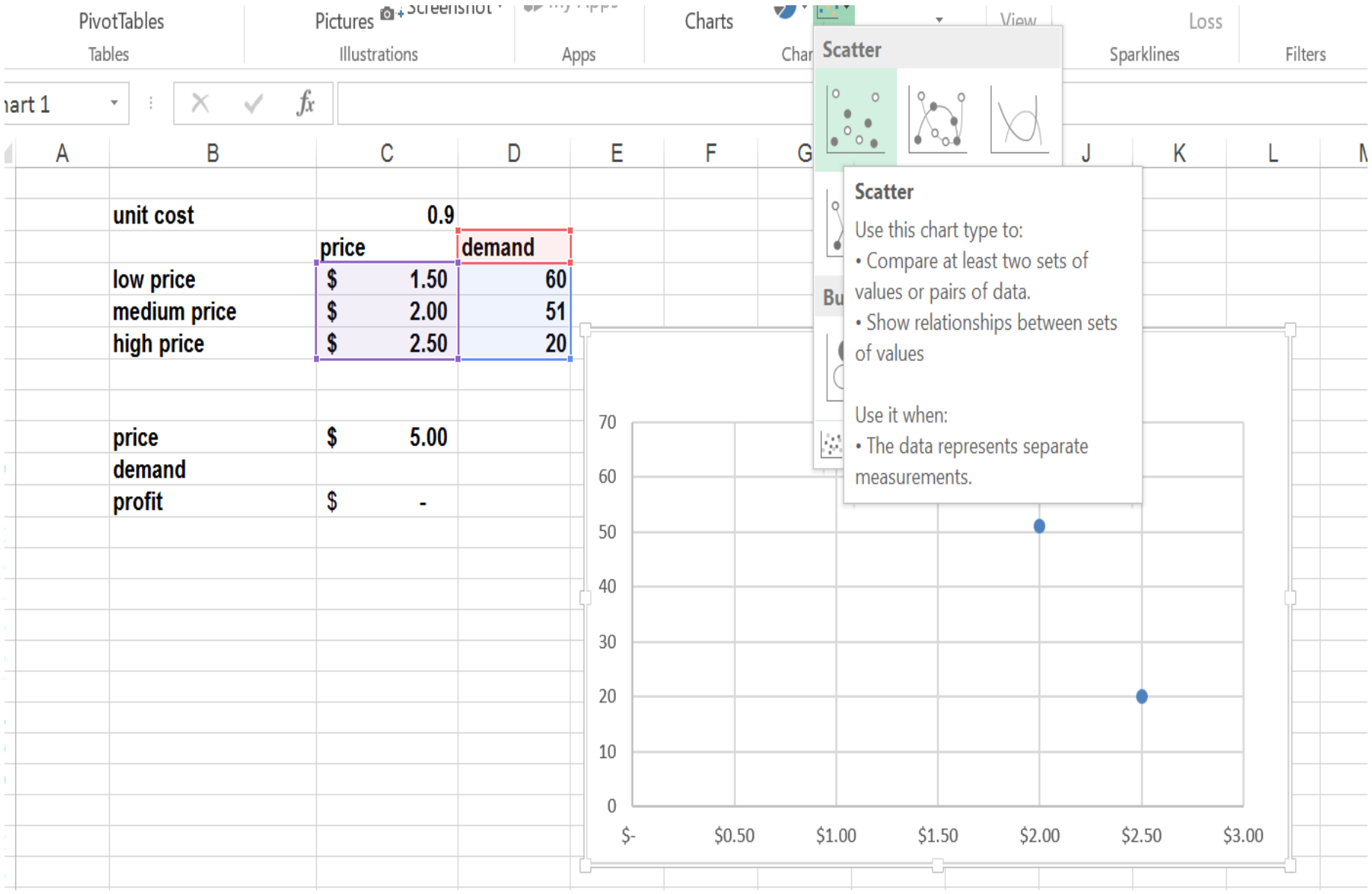
## Enter different prices in different cell

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

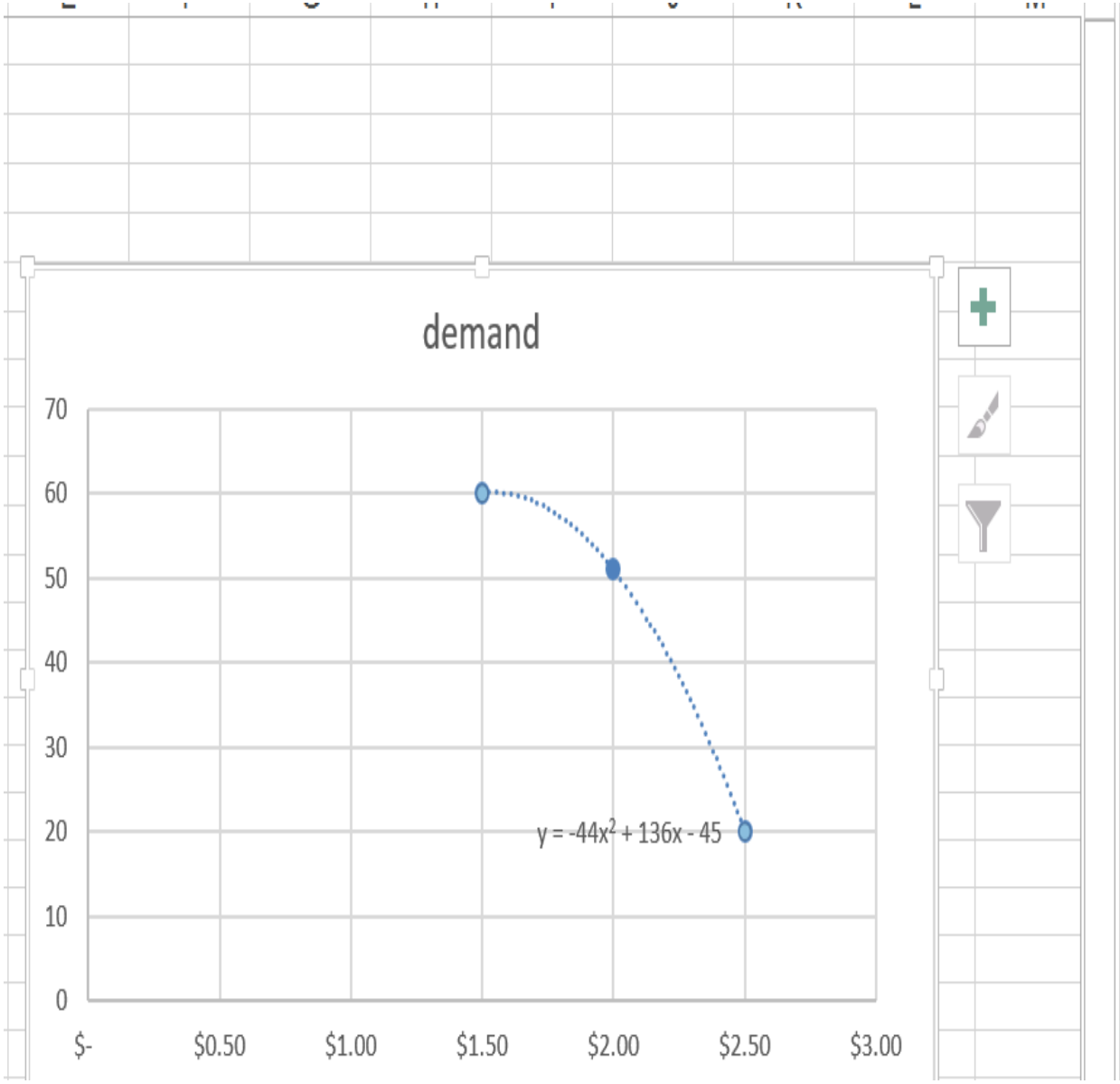
# Price Analytics

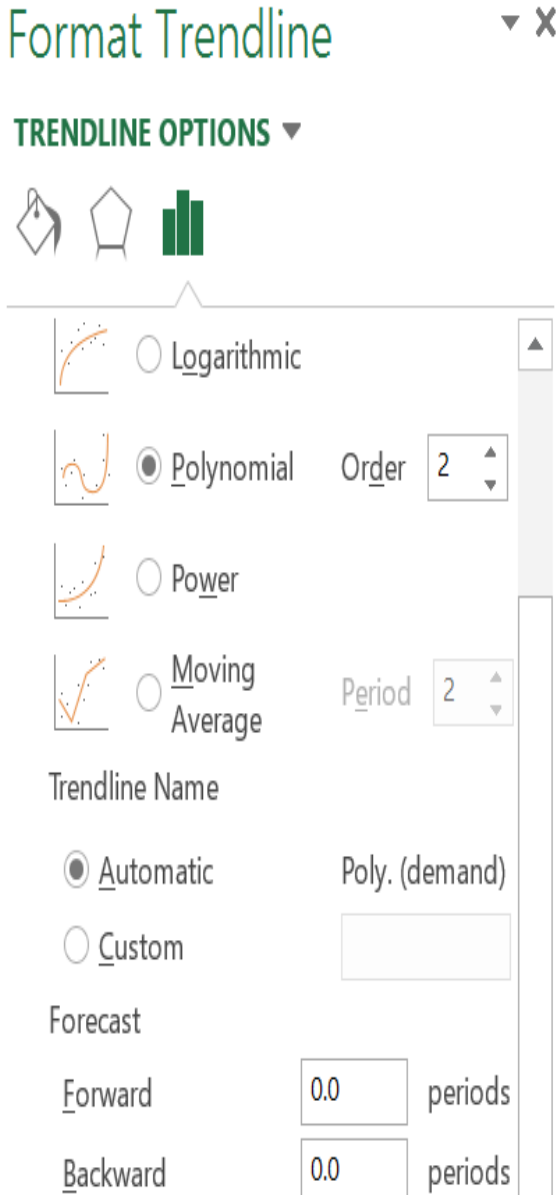
| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | unit cost | 0.9 | | |
| 3 | | | price | demand | |
| 4 | | low price | $ 1.50 | 60 | |
| 5 | | medium price | $ 2.00 | 51 | |
| 6 | | high price | $ 2.50 | 20 | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | price | $ 5.00 | | |
| 10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

# Price Analytics



# Price Analytics



# Price Analytics

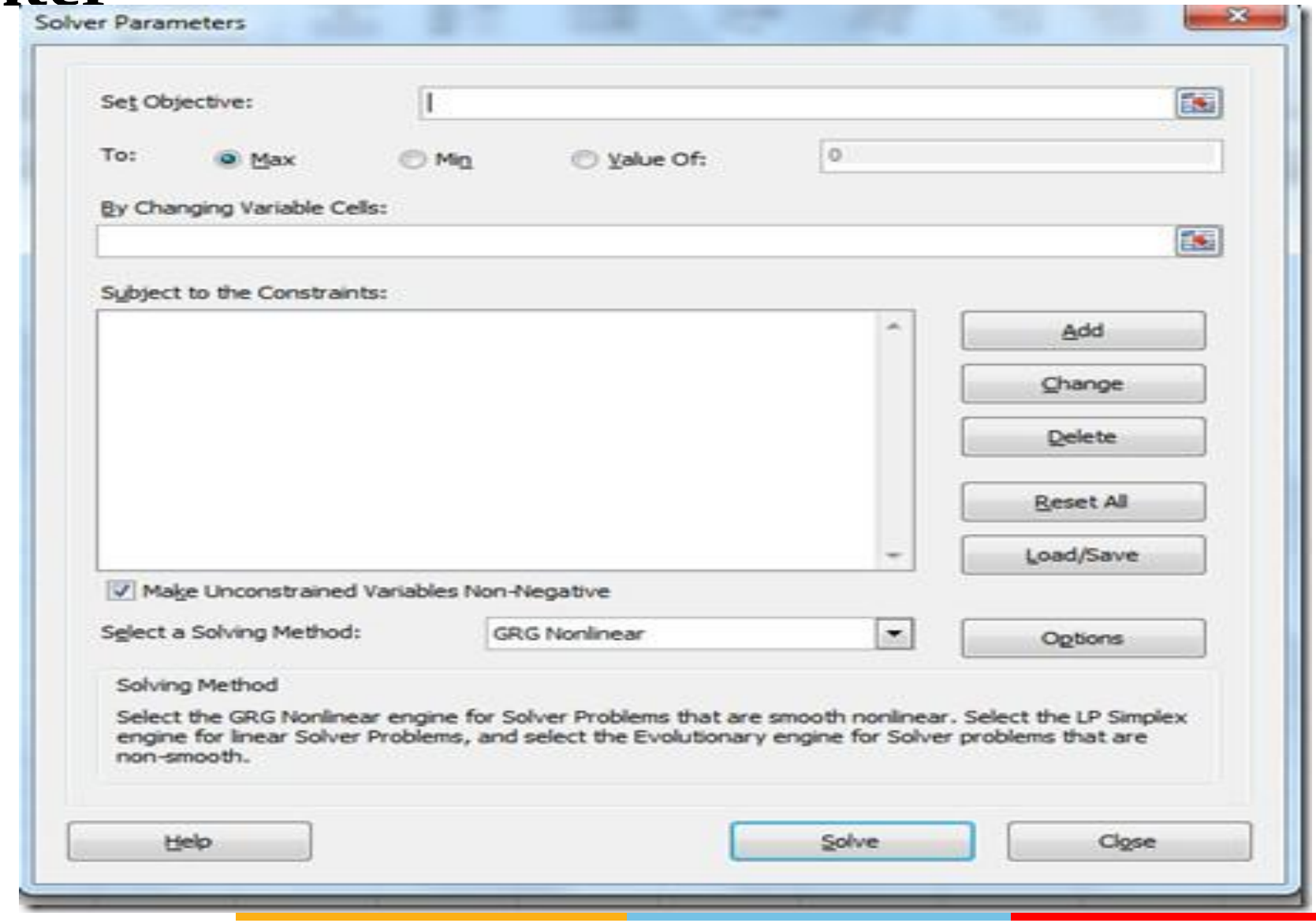
oard | Font | Al

=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



# Price Analytics

Set objective: profit value

By changing :trial price value

Subject to the constraints : prices between 1.50 -2.50

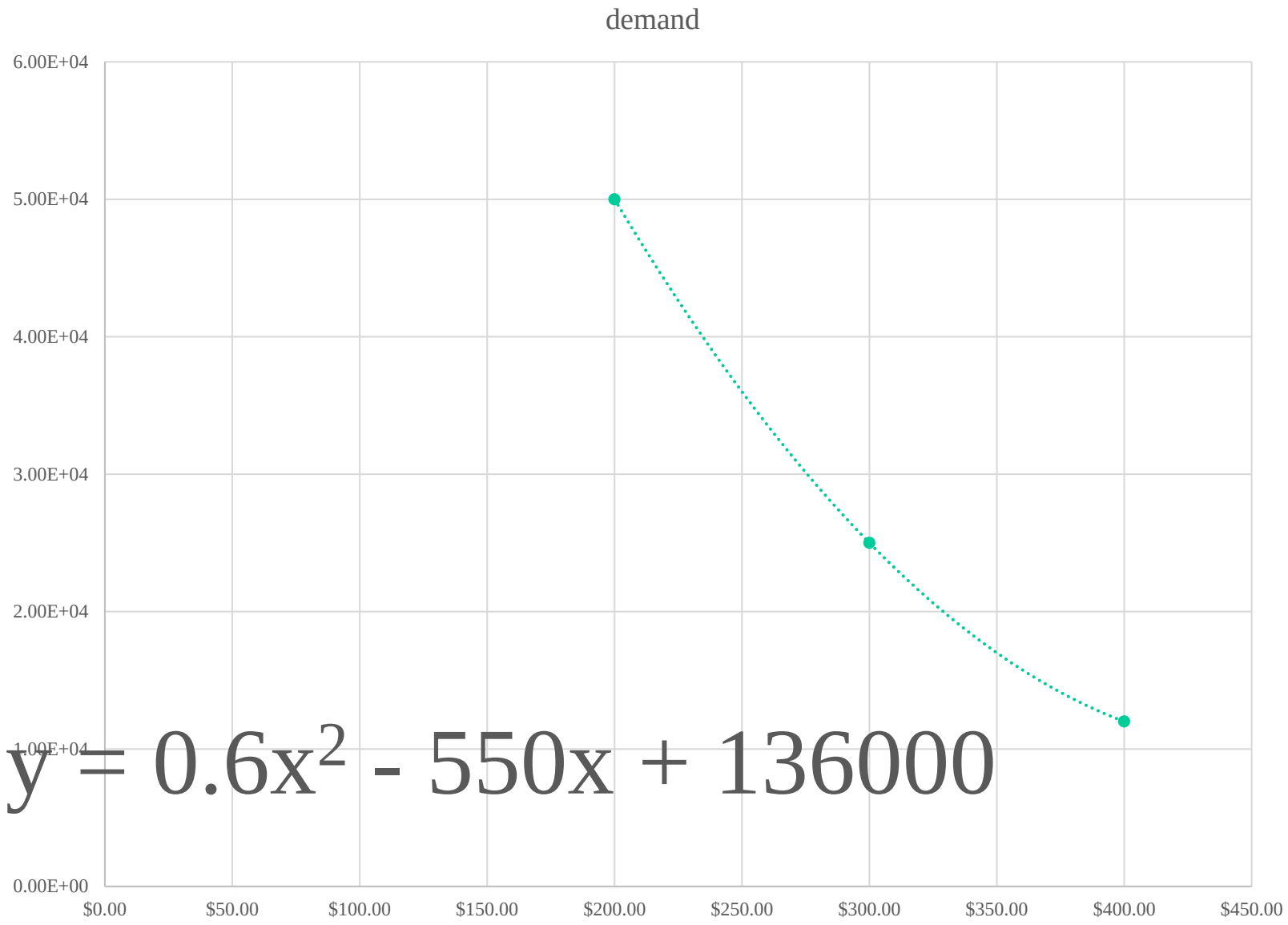
C

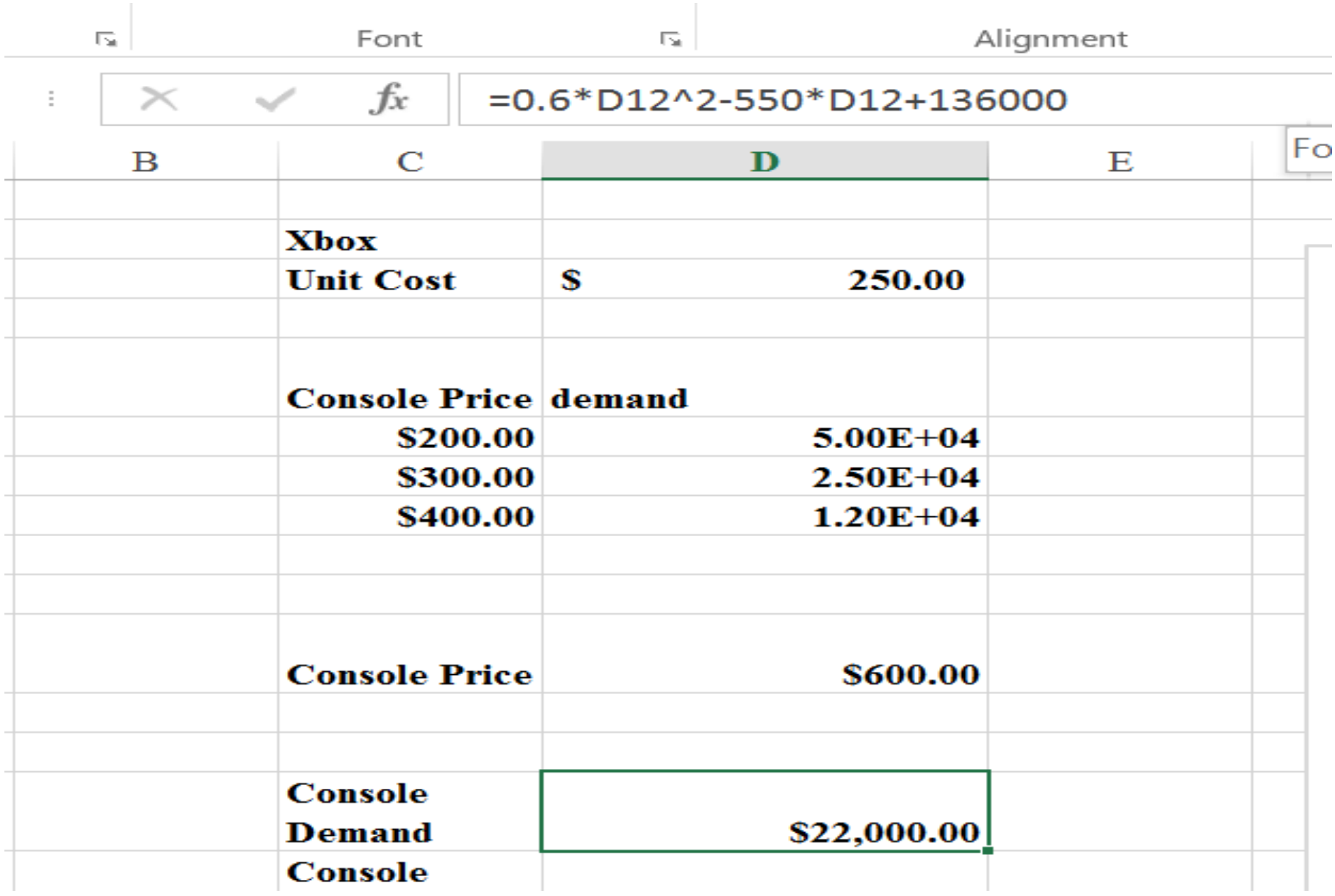
| | A | B | C | D |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | unit cost | 0.9 | |
| 3 | | | price | demand |
| 4 | | low price | $ 1.50 | 60 |
| 5 | | medium price | $ 2.00 | 51 |
| 6 | | high price | $ 2.50 | 20 |
| 7 | | | | |
| 8 | | | | |
| 9 | | price | $ 2.04 | |
| 10 | | demand | $ 49.40 | |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

7
6
5
4
3

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?

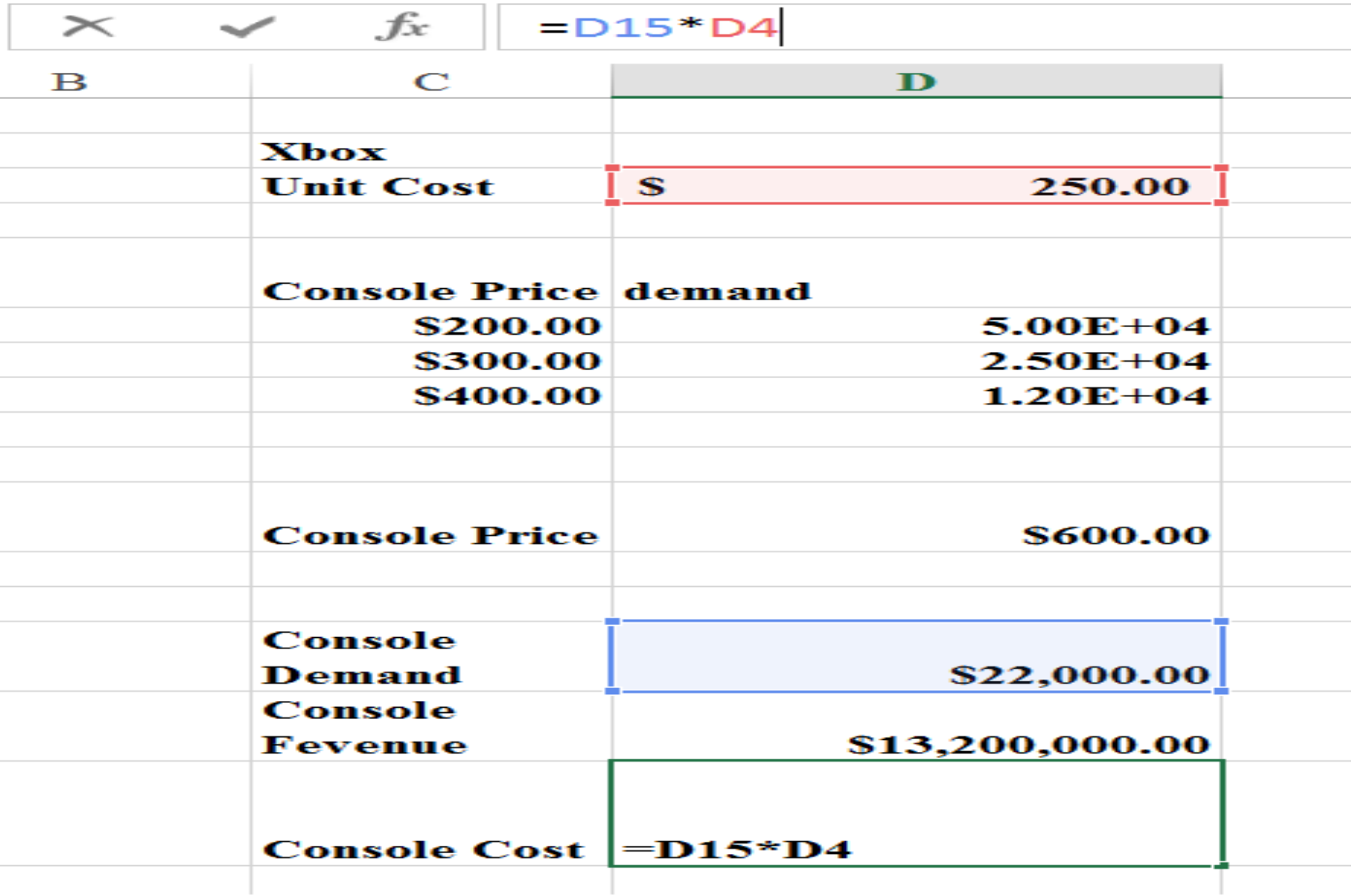
| Price | Demand |
|---|---|
| $200 | 50,000 |
| $300 | 25,000 |
| $400 | 12,000 |
| | |

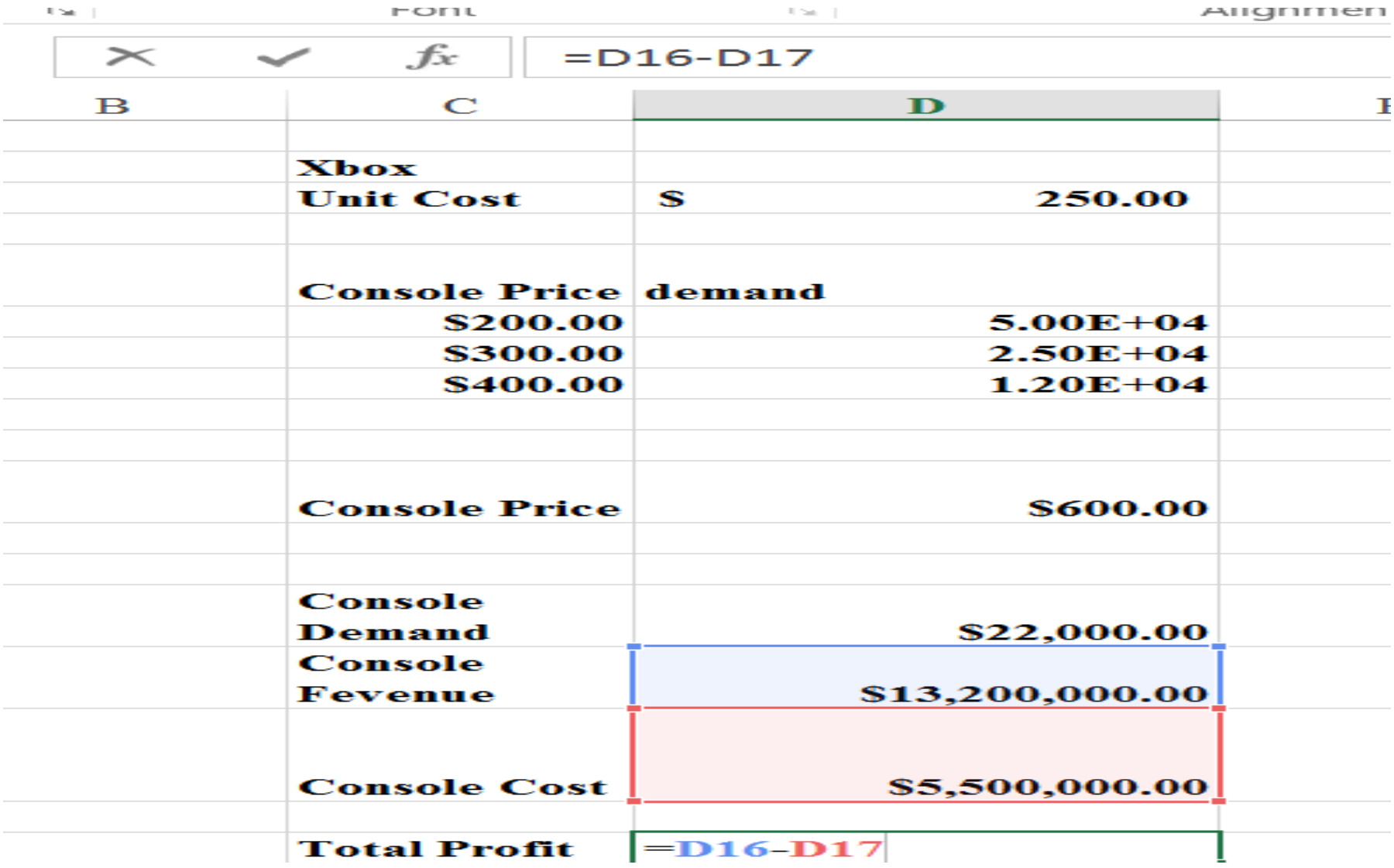

demand
6.00E+04
5.00E+04
4.00E+04
3.00E+04
2.00E+04
1.00E+04
0.00E+00
$0.00
$50.00
$100.00
$150.00
$200.00
$250.00
$300.00
$350.00
$400.00
$450.00
y = 0.6x² - 550x + 136000

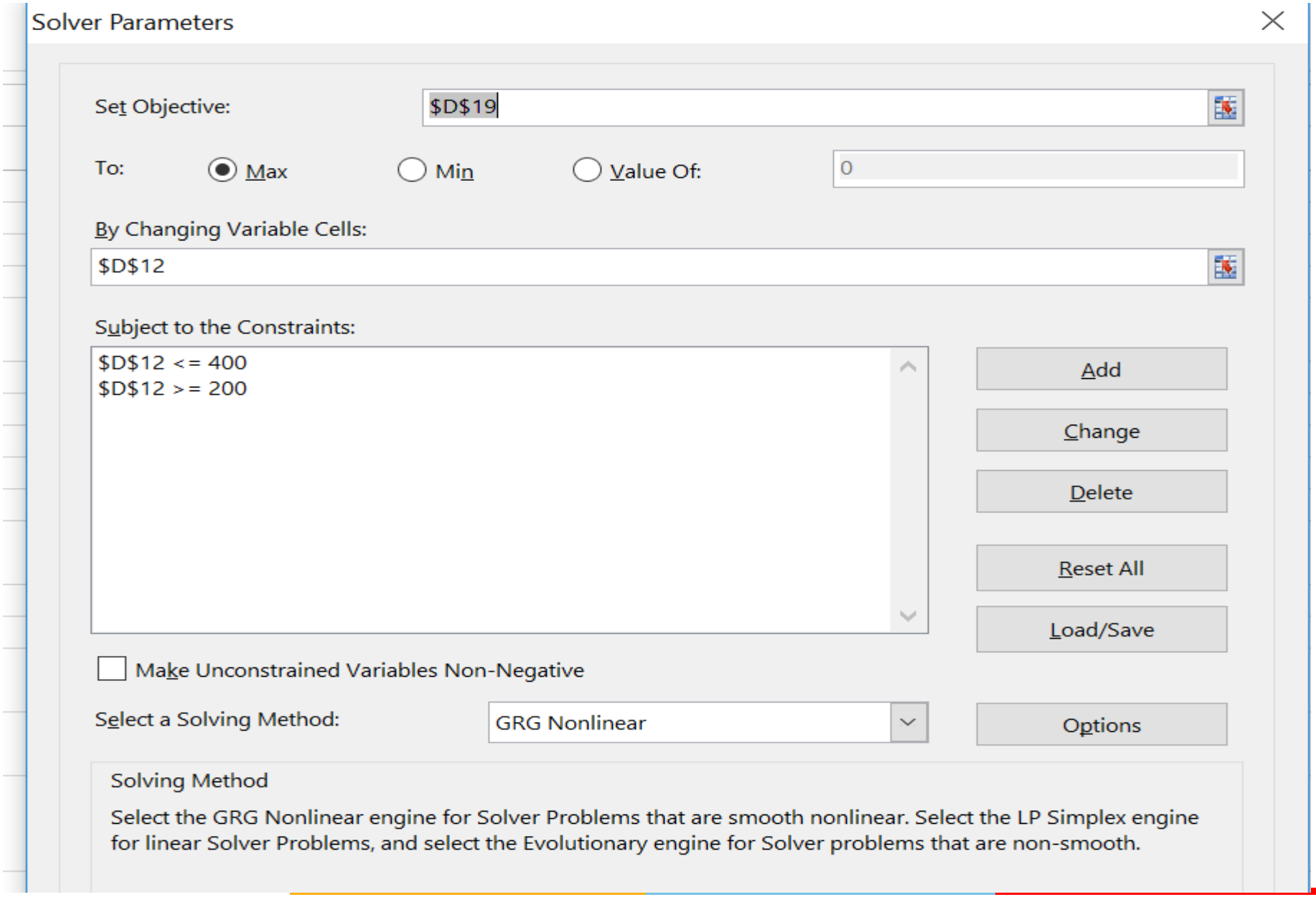

Font
Alignment
=0.6*D12^2-550*D12+136000
B
C
D
E
Xbox
Unit Cost
$
250.00
Console Price
demand
$200.00
5.00E+04
$300.00
2.50E+04
$400.00
1.20E+04
Console Price
$600.00
Console
Demand
$22,000.00
Console

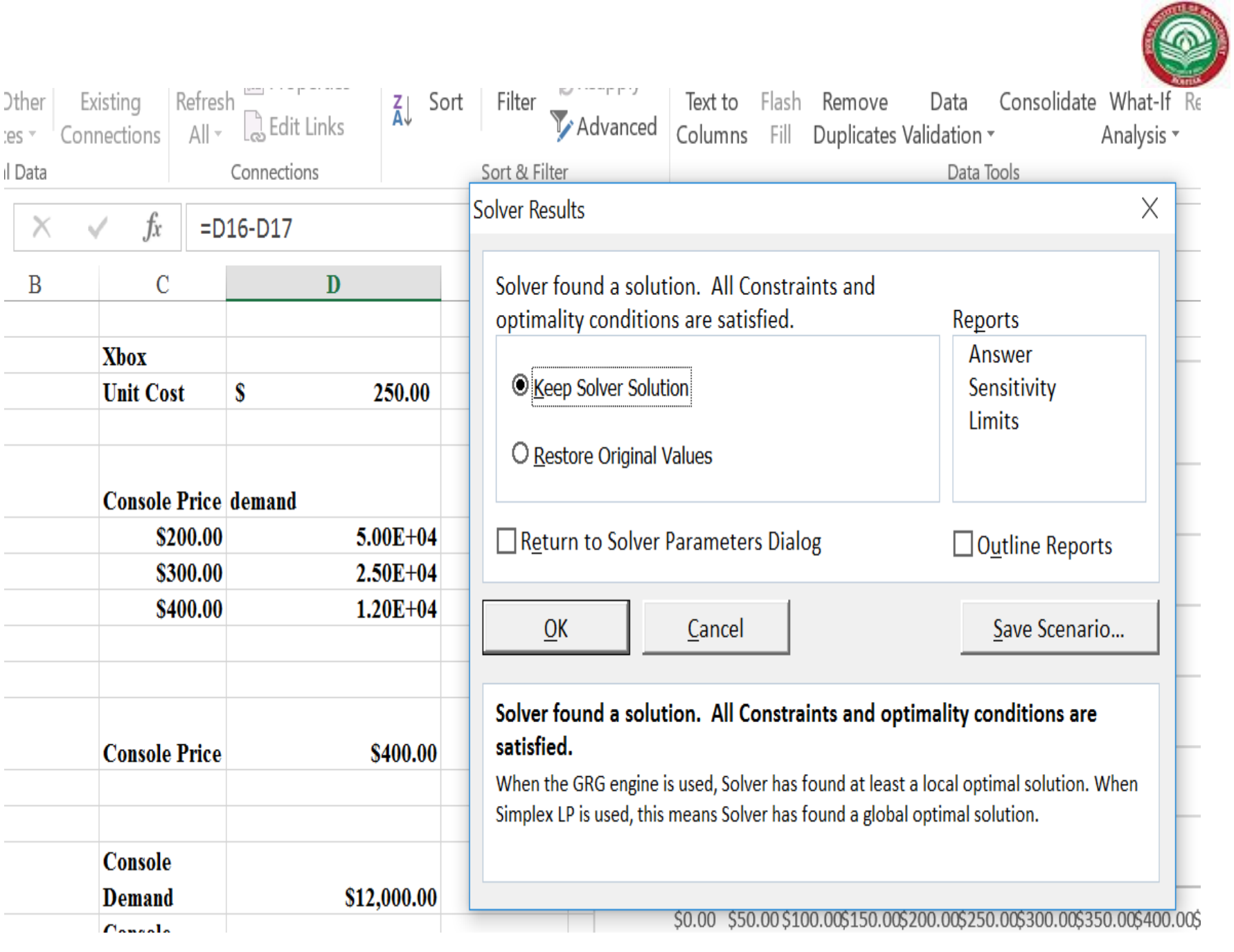
=D15*(D12)

| 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** |
| | | | |


=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 Fevenue
$13,200,000.00
Console Cost
=D15*D4


Font
Alignmen
=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 $600.00
Console Demand $22,000.00
Console Fevenue $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.


Other
Existing Connections
Refresh All
Edit Links
Connections
Sort
Filter
Advanced
Sort & Filter
Text to Columns
Flash Fill
Remove Duplicates
Data Validation
Consolidate
What-If Analysis
Data Tools
=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.
Reports
Keep Solver Solution
Restore Original Values
Answer
Sensitivity
Limits
Return to Solver Parameters Dialog
Outline Reports
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

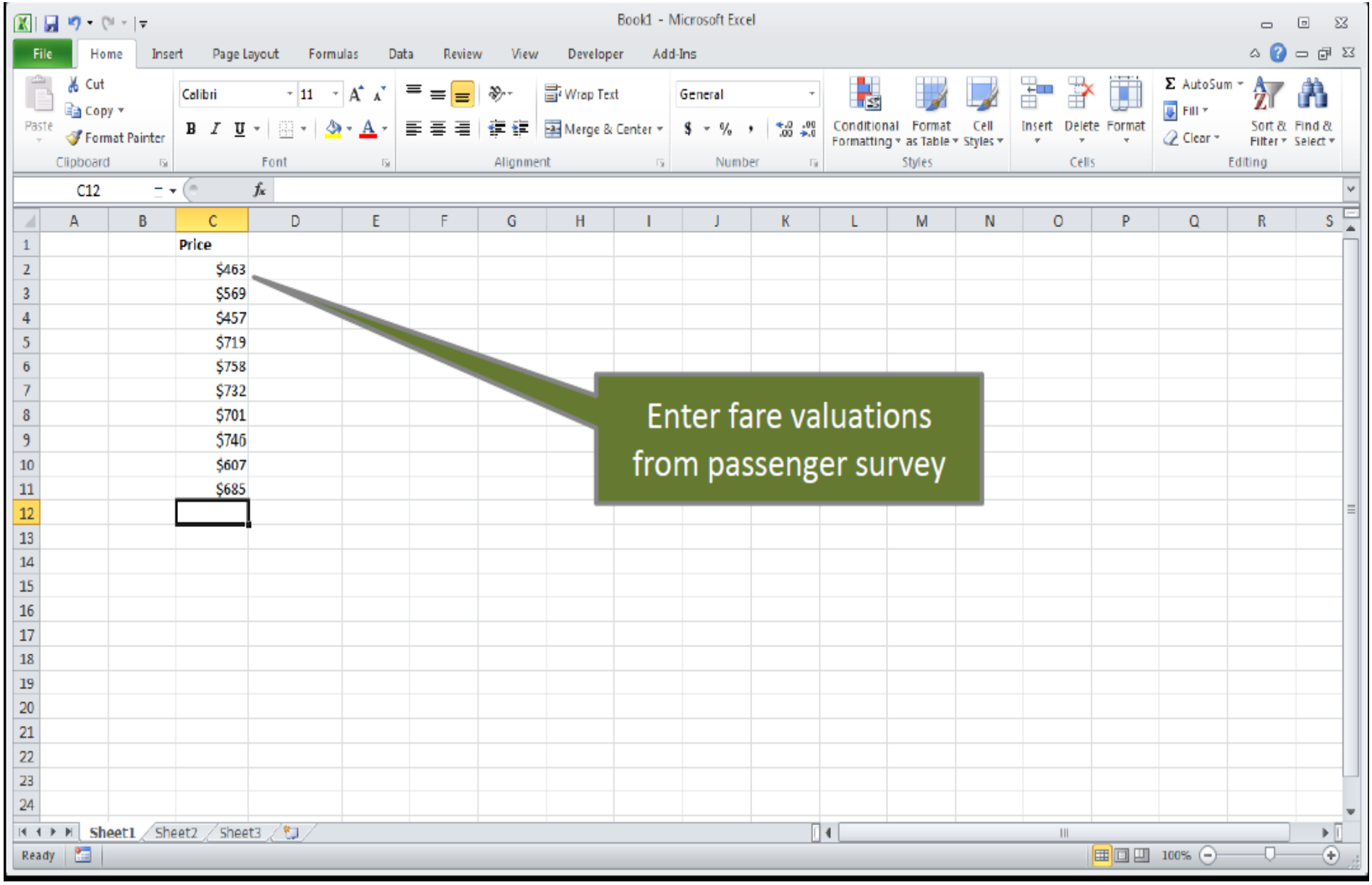
# Revenue Analytics

## Example: Malaysia Airlines Flight 19

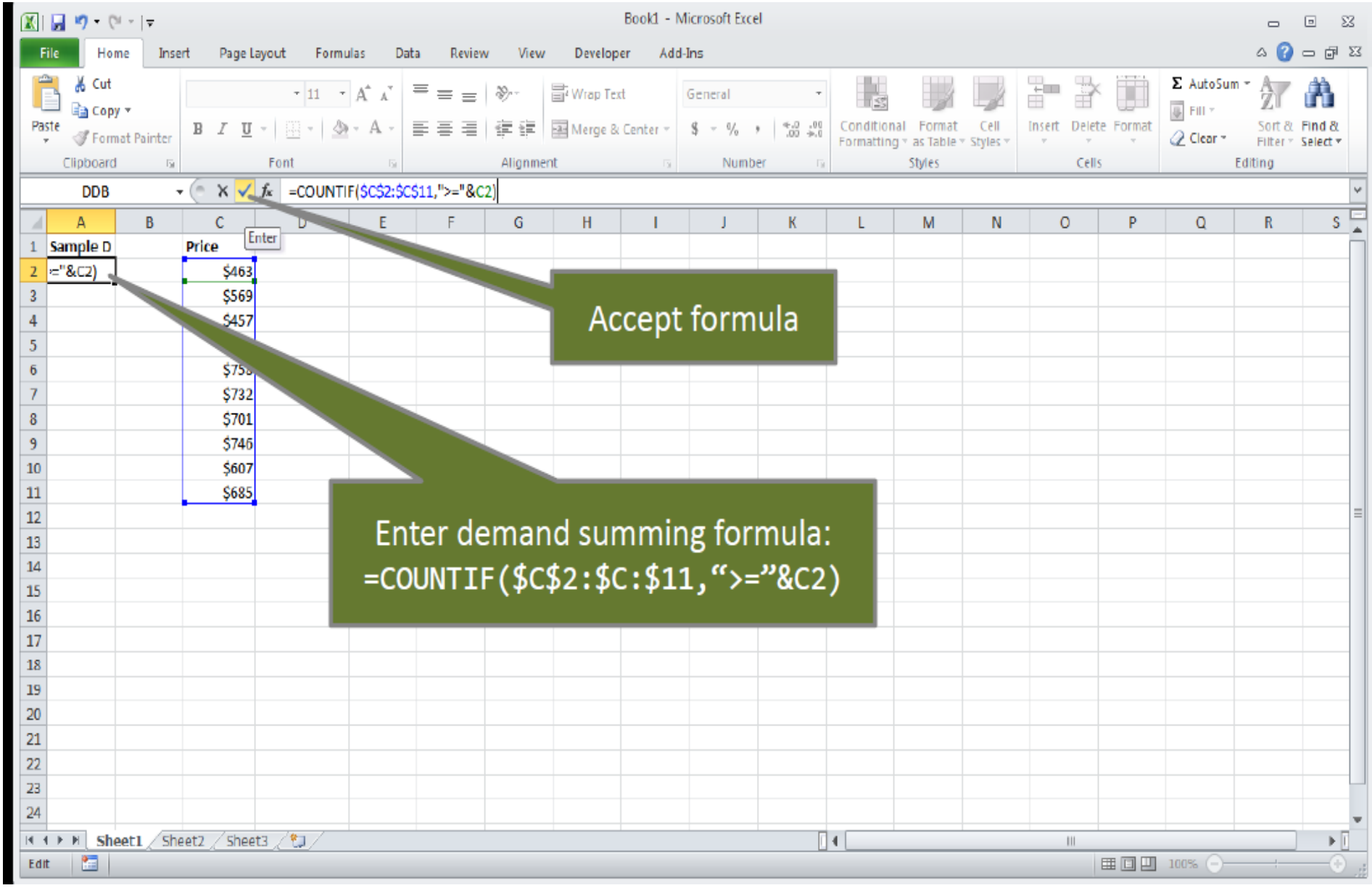
- Valuations effectively the same as points on the demand curve
- Calculate demand by finding number of people who would buy tickets at each price point

| | |
|---|---|
| $463 | $732 |
| $569 | $701 |
| $457 | $746 |
| $719 | $607 |
| $758 | $685 |

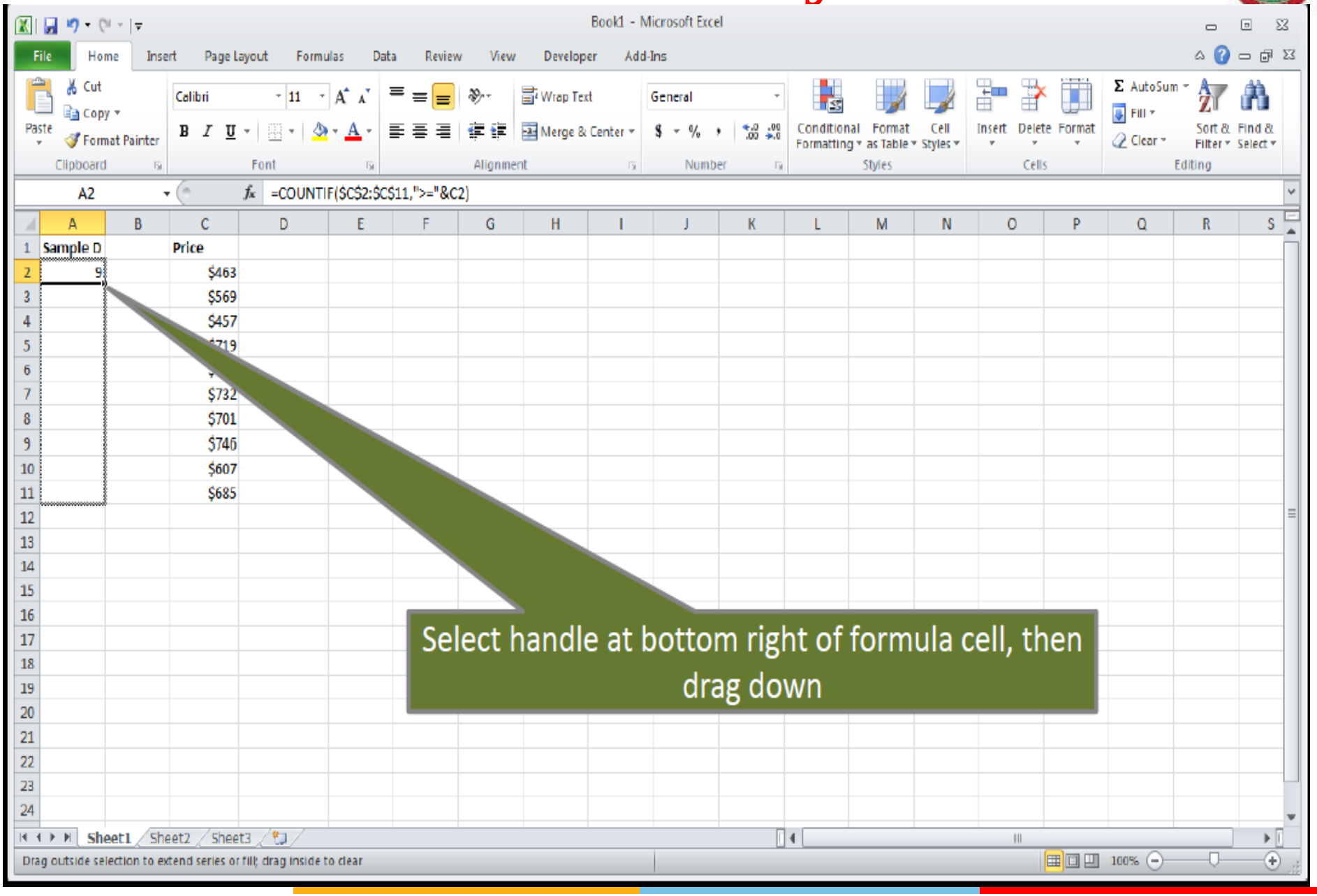
# Revenue Analytics



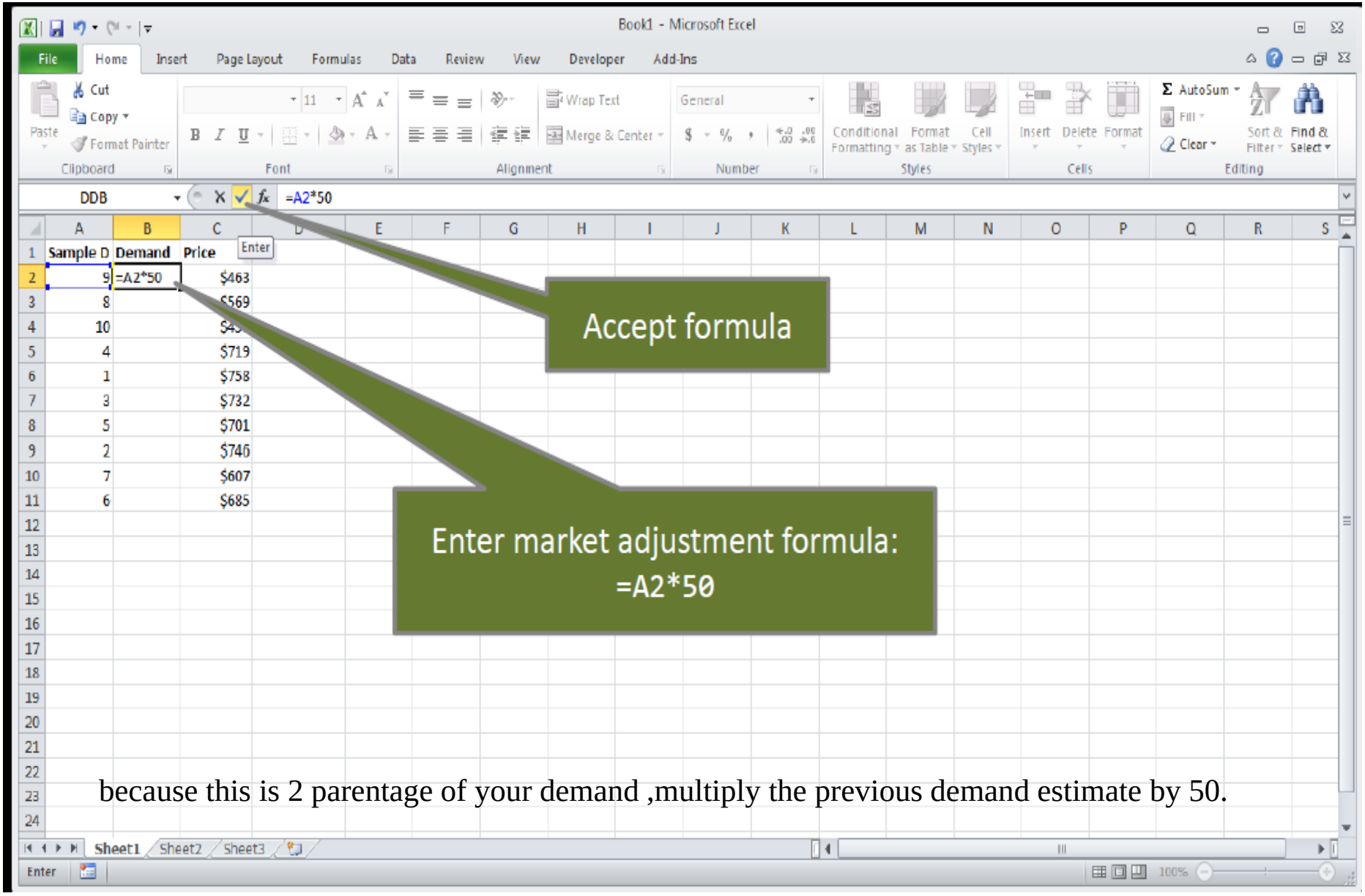
# Revenue Analytics



# Revenue Analytics



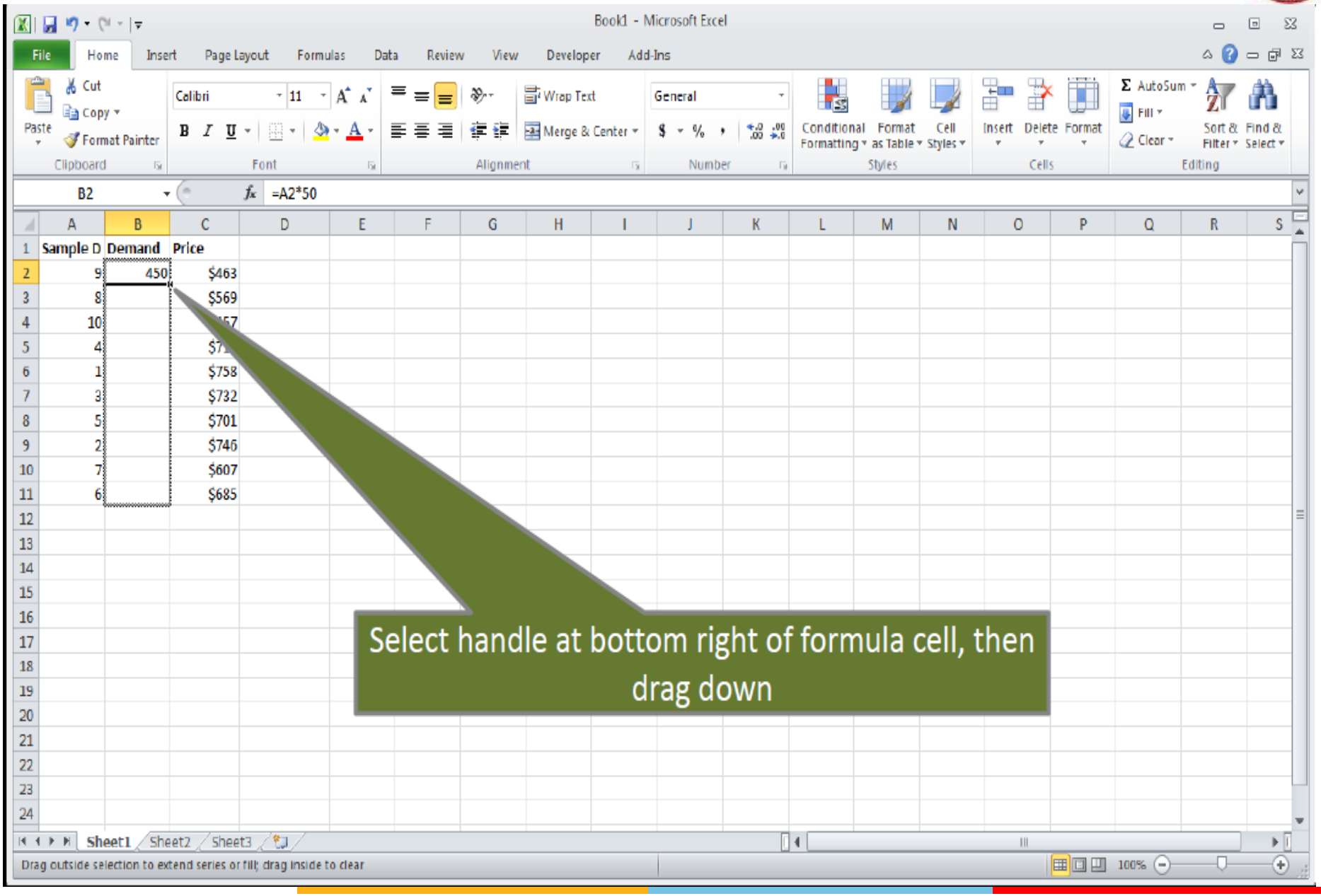
# Revenue Analytics



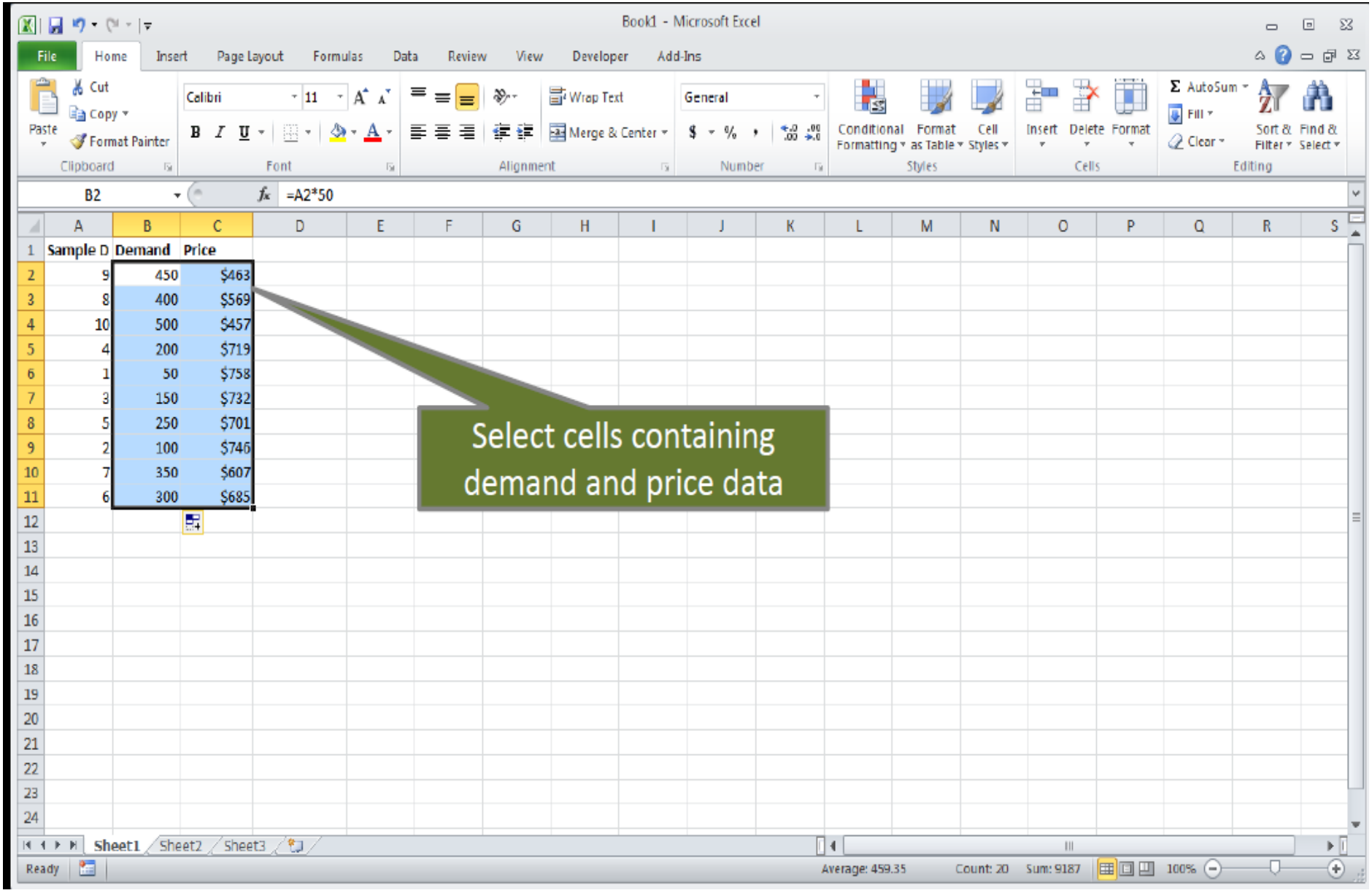

| | A | B | C |
|---|---|---|---|
| 1 | Sample D | Demand | Price |
| 2 | 9 | =A2*50 | $463 |
| 3 | 8 | | $569 |
| 4 | 10 | | $4 |
| 5 | 4 | | $719 |
| 6 | 1 | | $758 |
| 7 | 3 | | $732 |
| 8 | 5 | | $701 |
| 9 | 2 | | $746 |
| 10 | 7 | | $607 |
| 11 | 6 | | $685 |

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

# Revenue Analytics

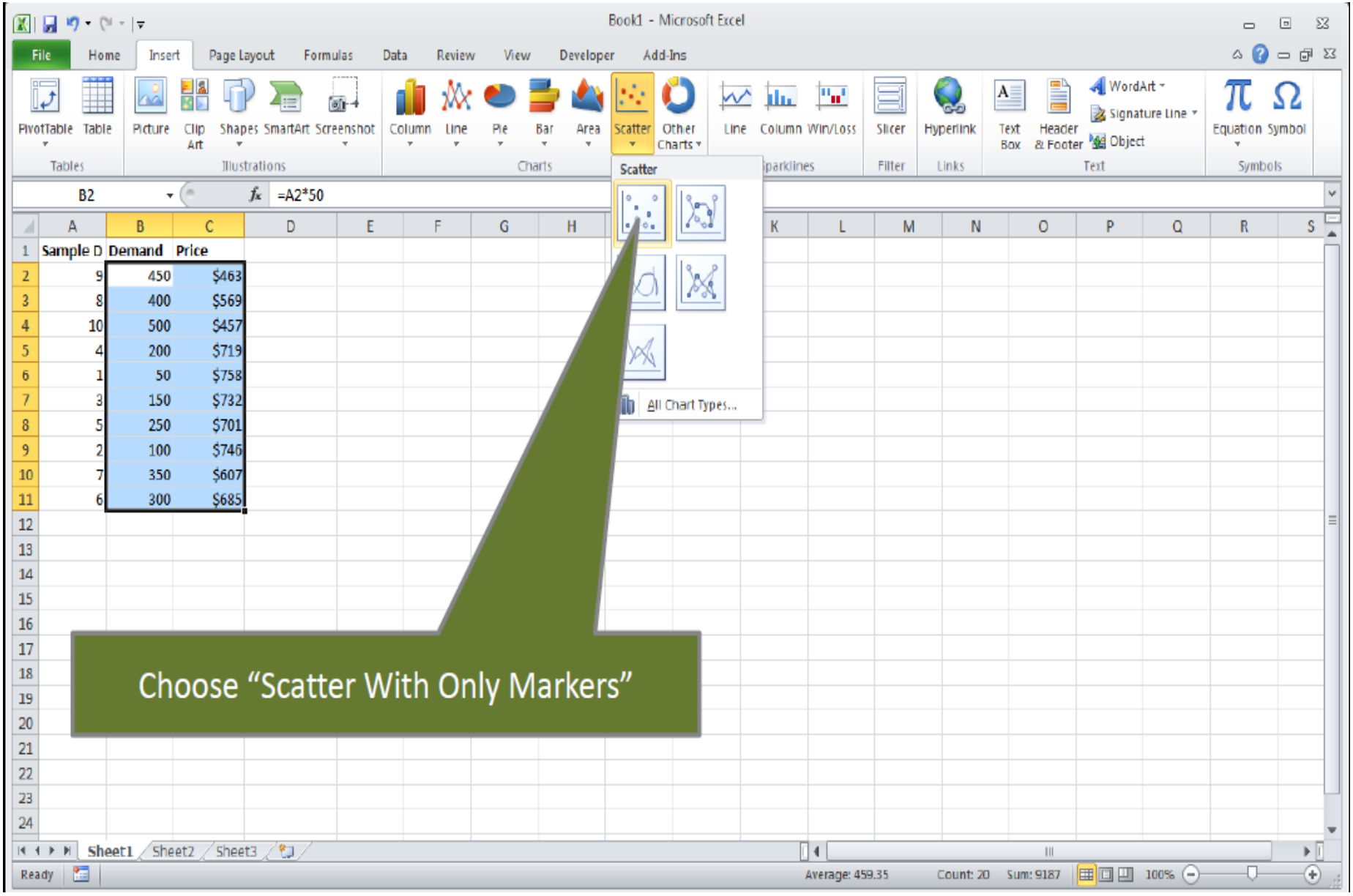


# Revenue Analytics

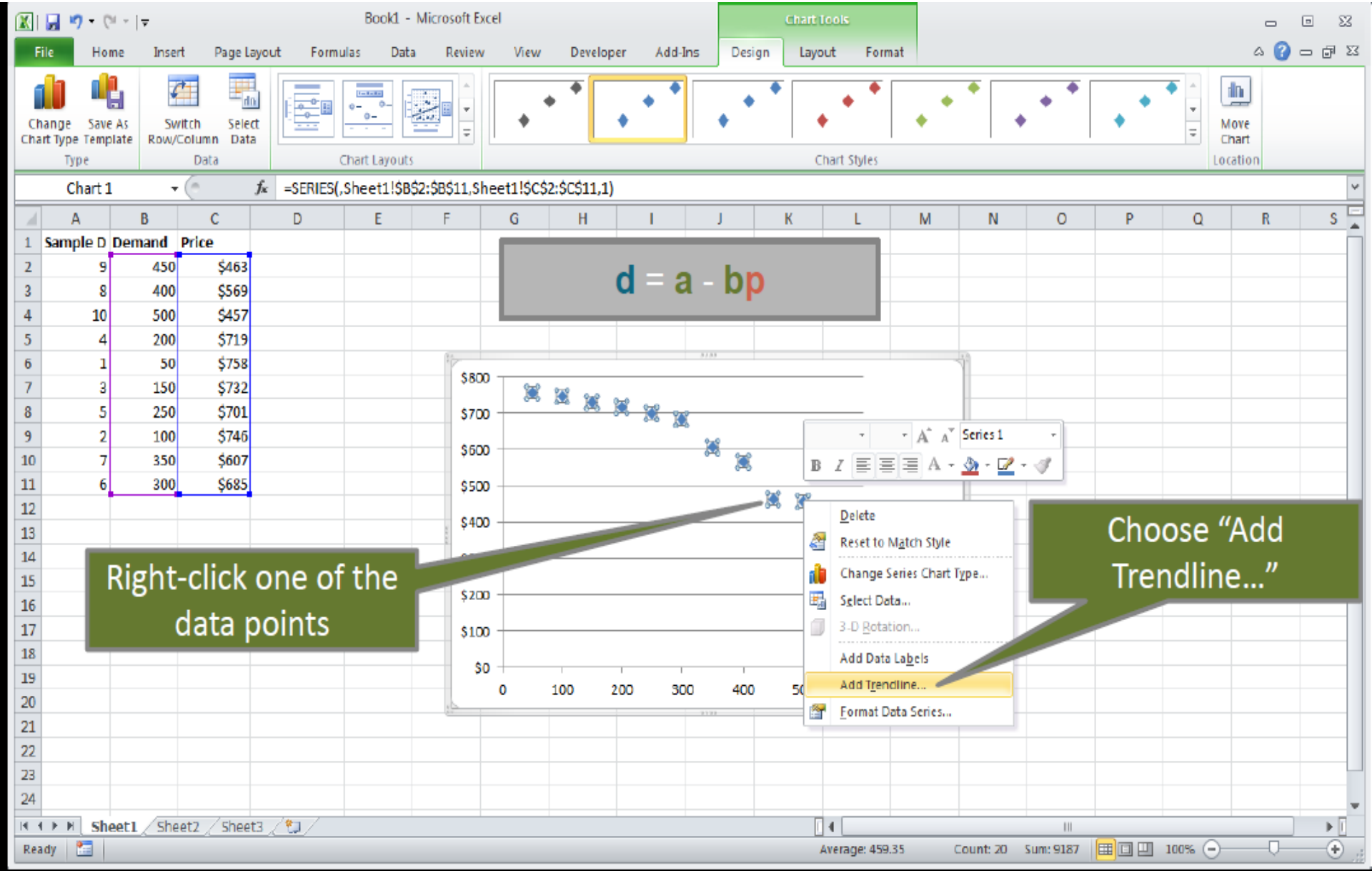



| Sample D | Demand | Price |
|---|---|---|
| 9 | 450 | $463 |
| 8 | 400 | $569 |
| 10 | 500 | $457 |
| 4 | 200 | $719 |
| 1 | 50 | $758 |
| 3 | 150 | $732 |
| 5 | 250 | $701 |
| 2 | 100 | $746 |
| 7 | 350 | $607 |
| 6 | 300 | $685 |

# Revenue Analytics



# Revenue Analytics

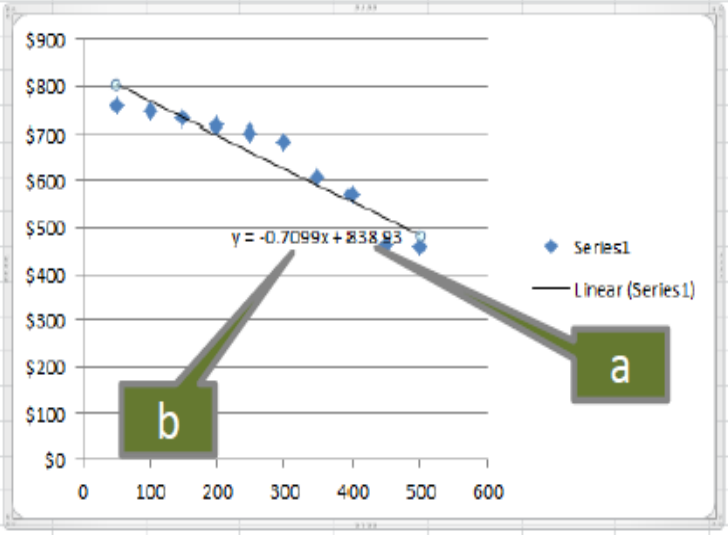


# Revenue Analytics

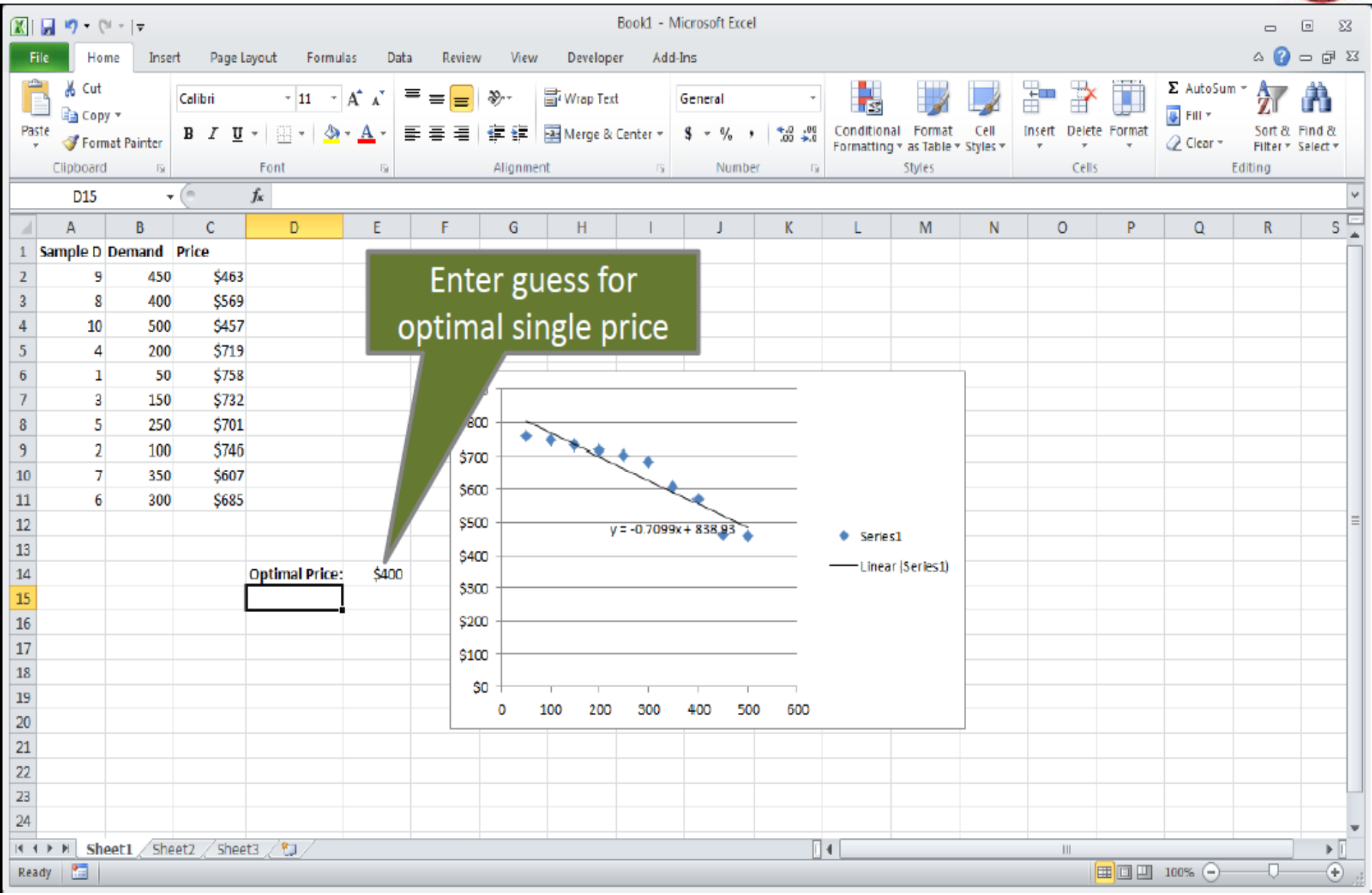
Book1 - Microsoft Excel

| Sample D | 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 |

$$d = 838.9 - 0.7p$$



# Revenue Analytics

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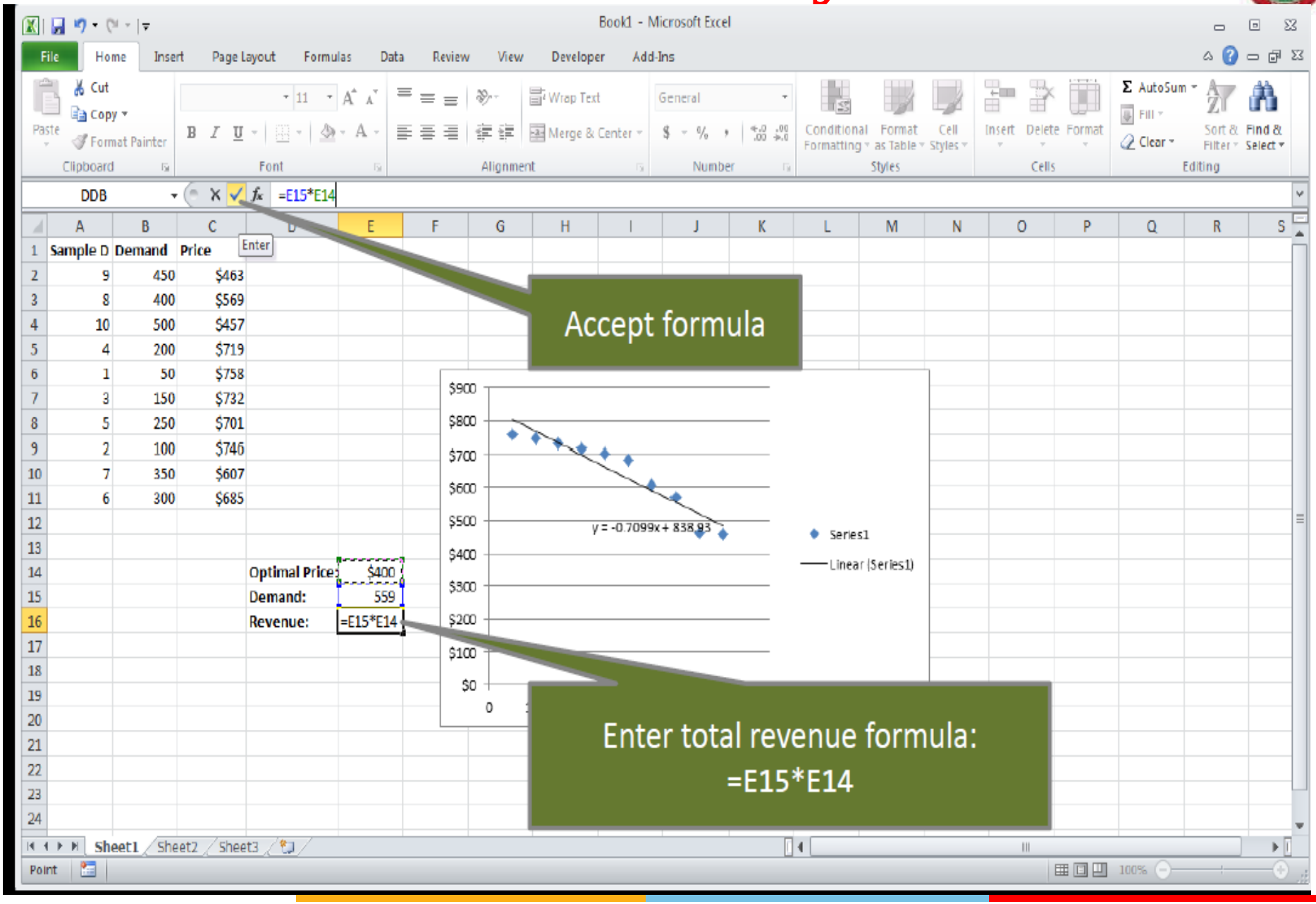
# Revenue Analytics



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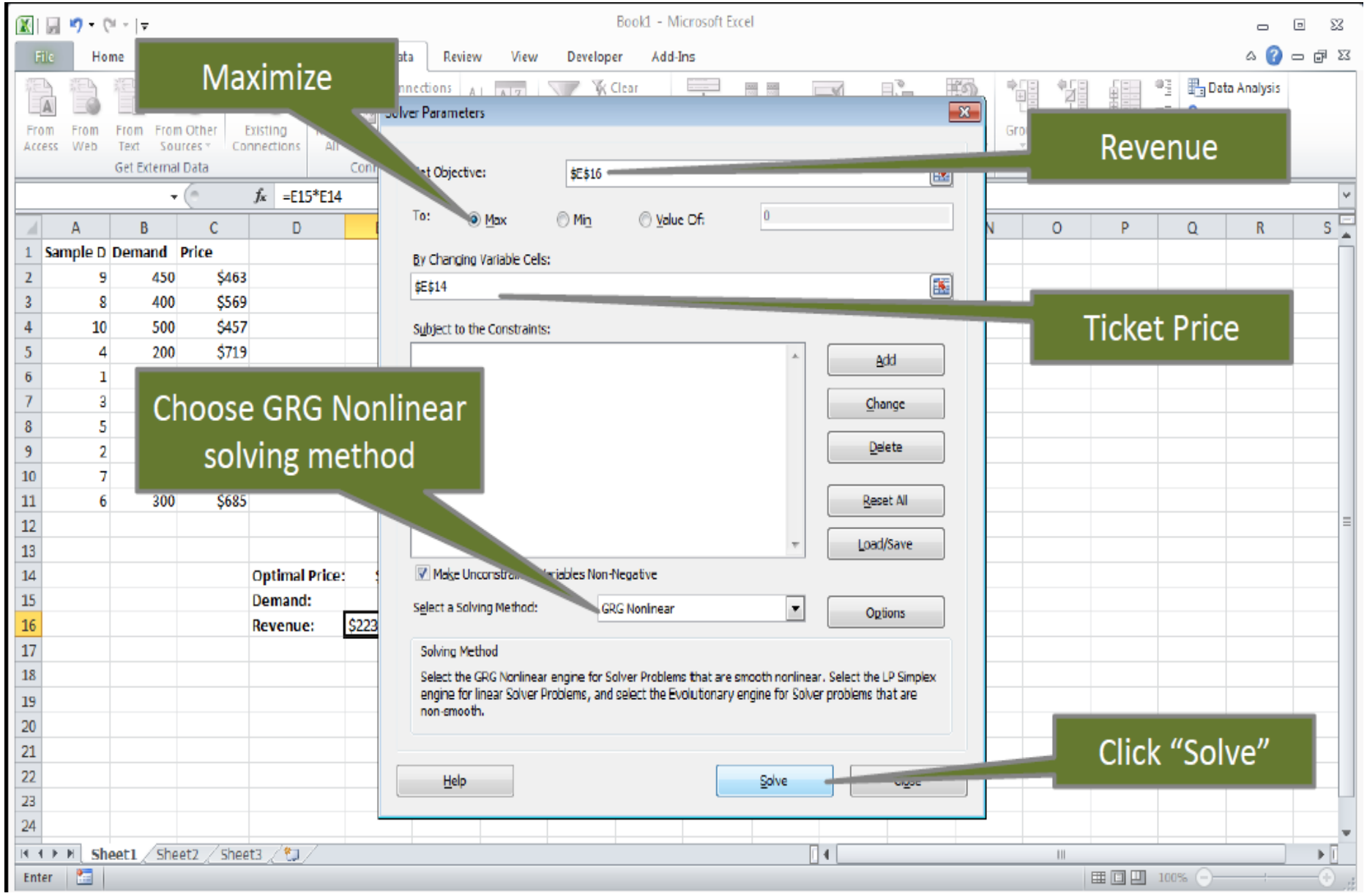


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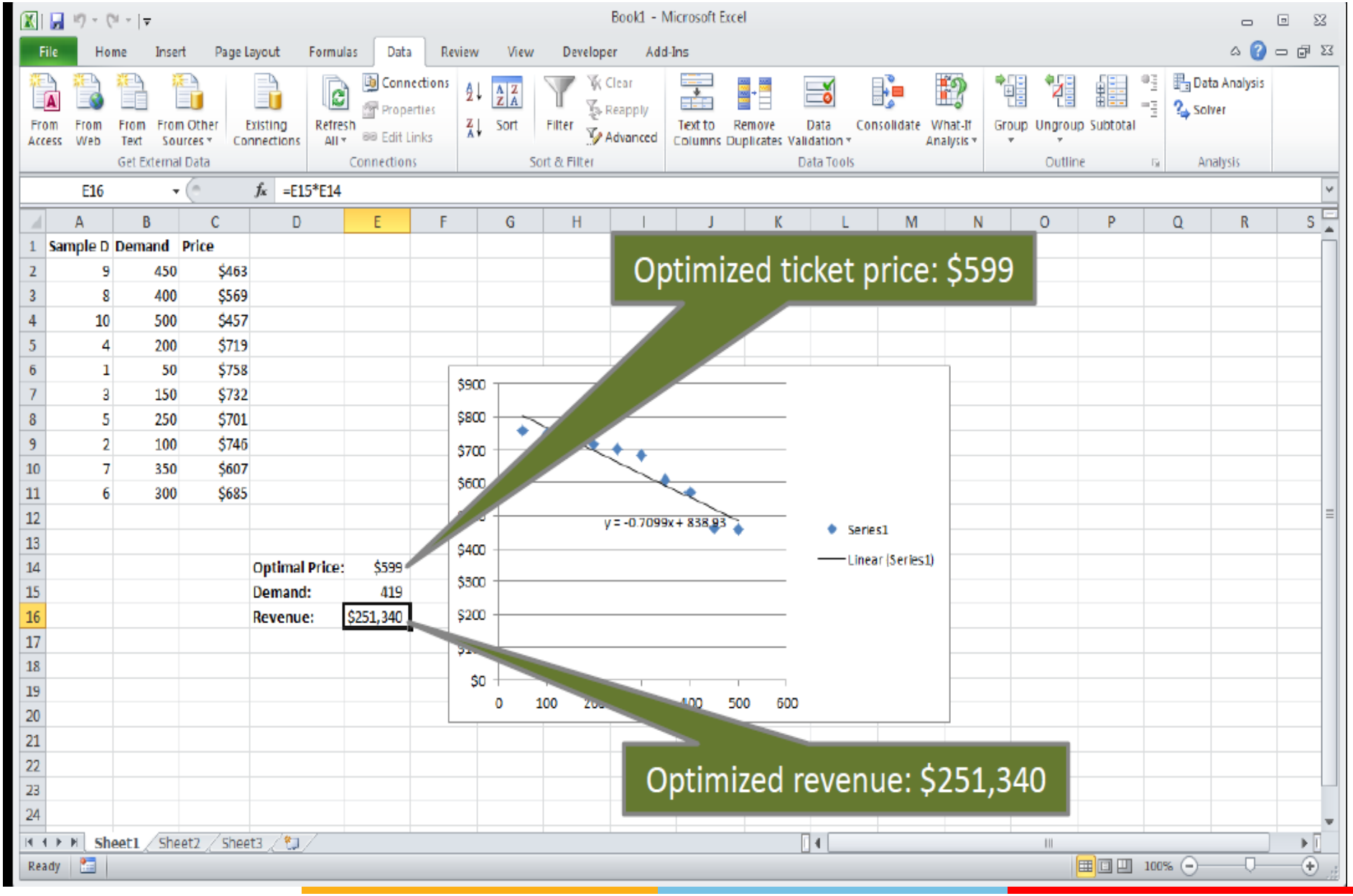
# Revenue Analytics

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| 5 | 250 | $701 |
| 2 | 100 | $746 |
| 7 | 350 | $607 |
| 6 | 300 | $685 |

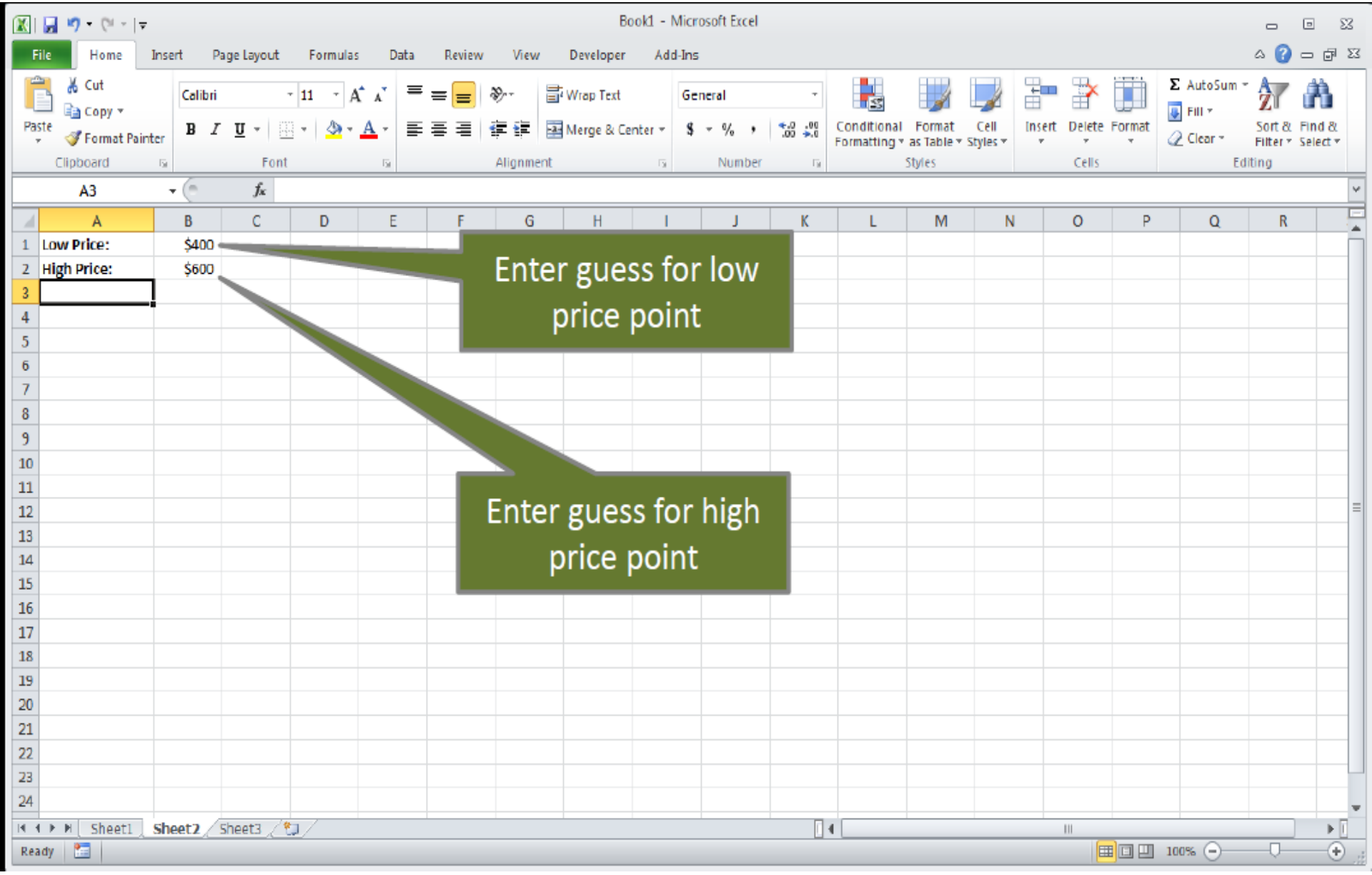
| | |
|---|---|
| Optimal Price: | $599 |
| Demand: | 419 |
| Revenue: | $251,340 |

# Revenue Analytics

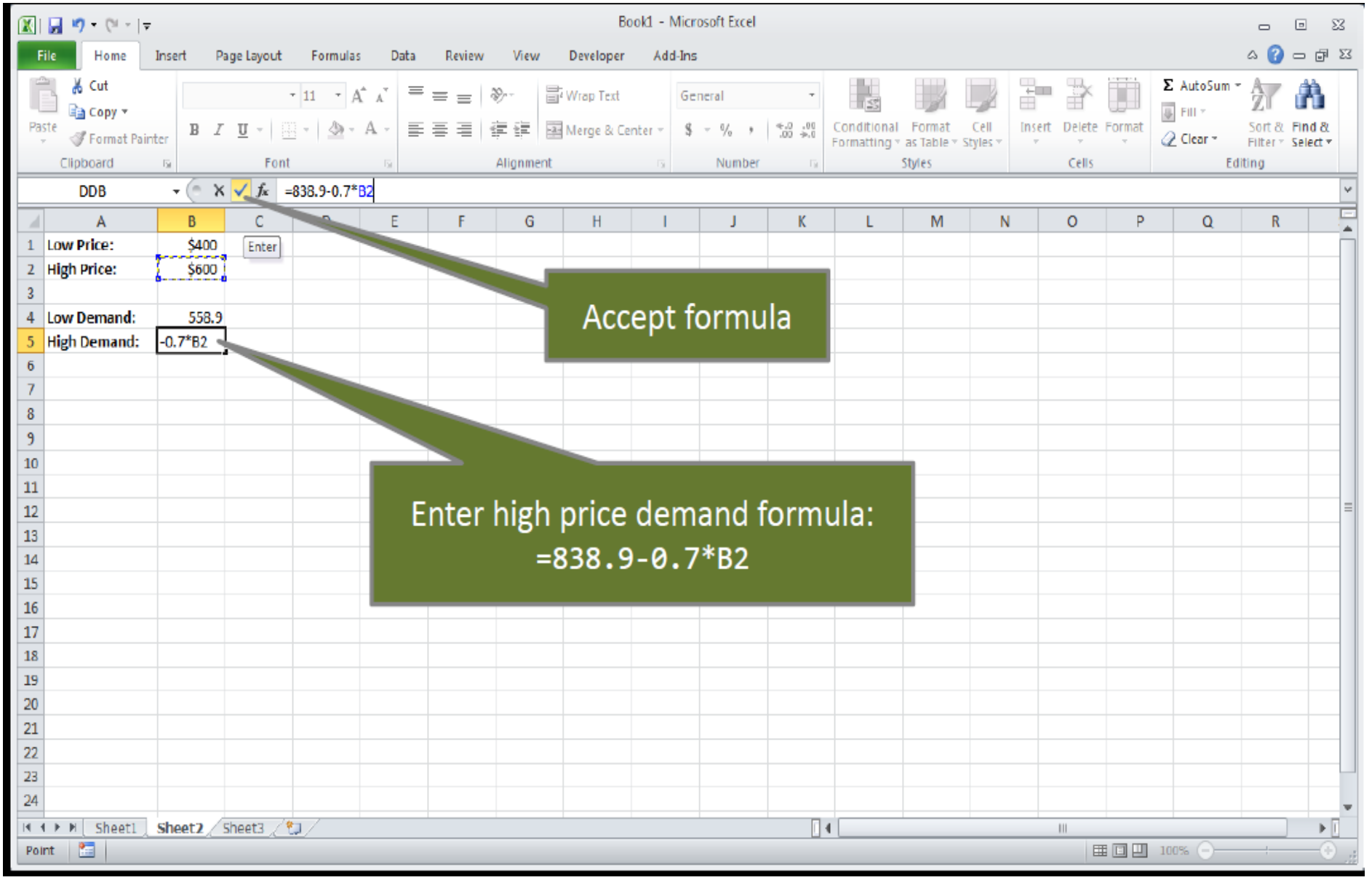
## Yield Management

- 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

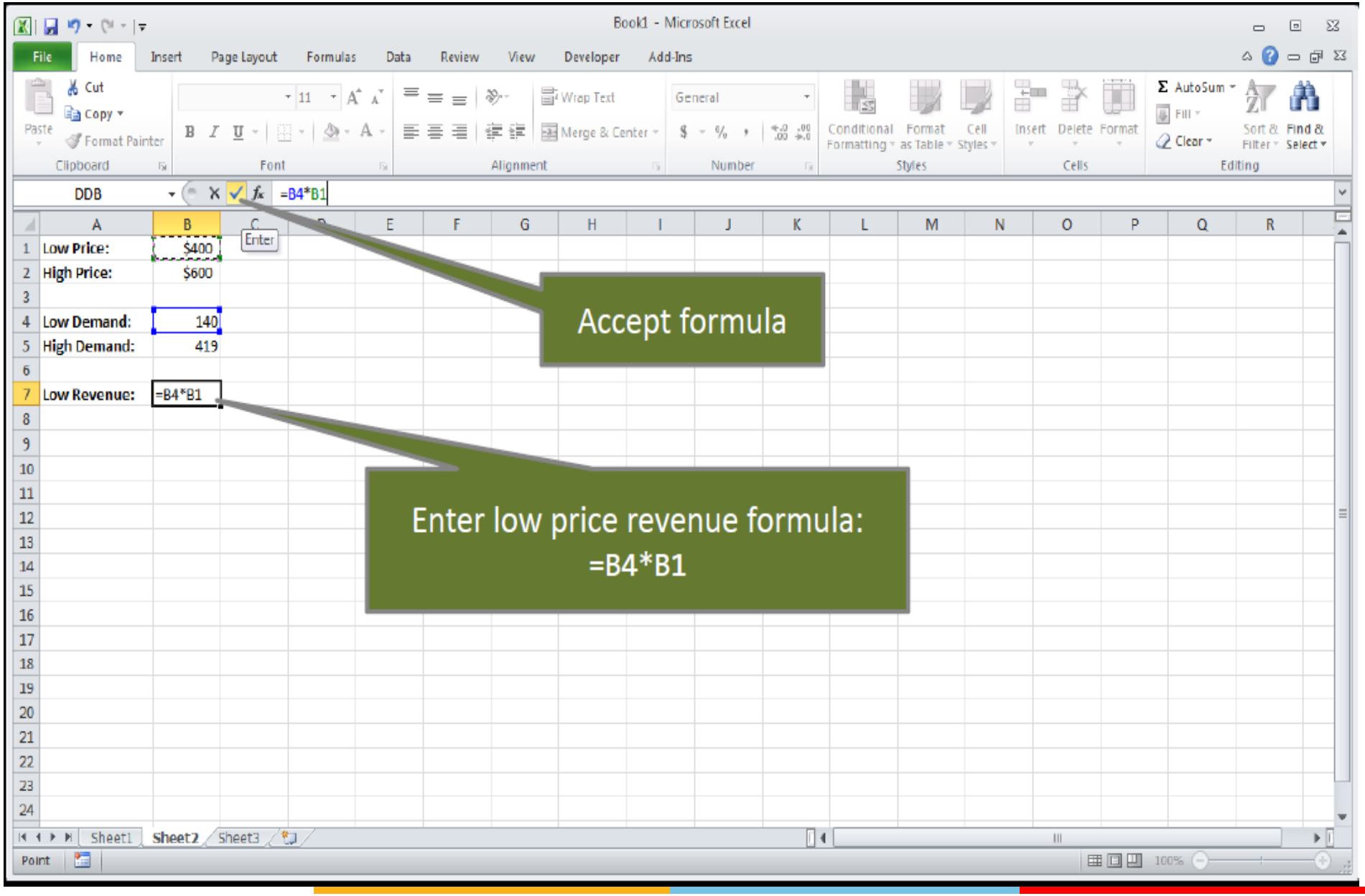
# Revenue Analytics



# Revenue Analytics



# Revenue Analytics



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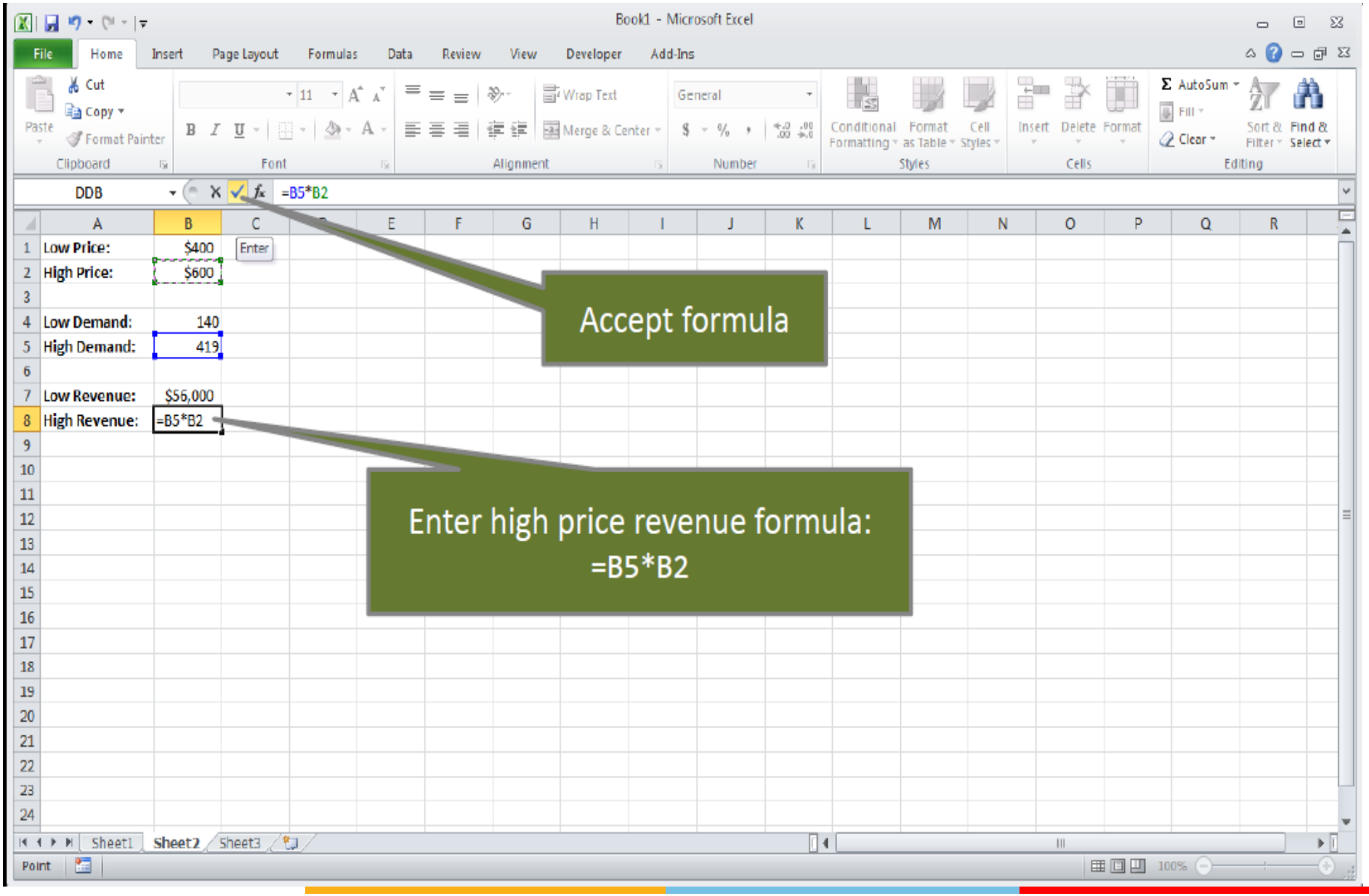
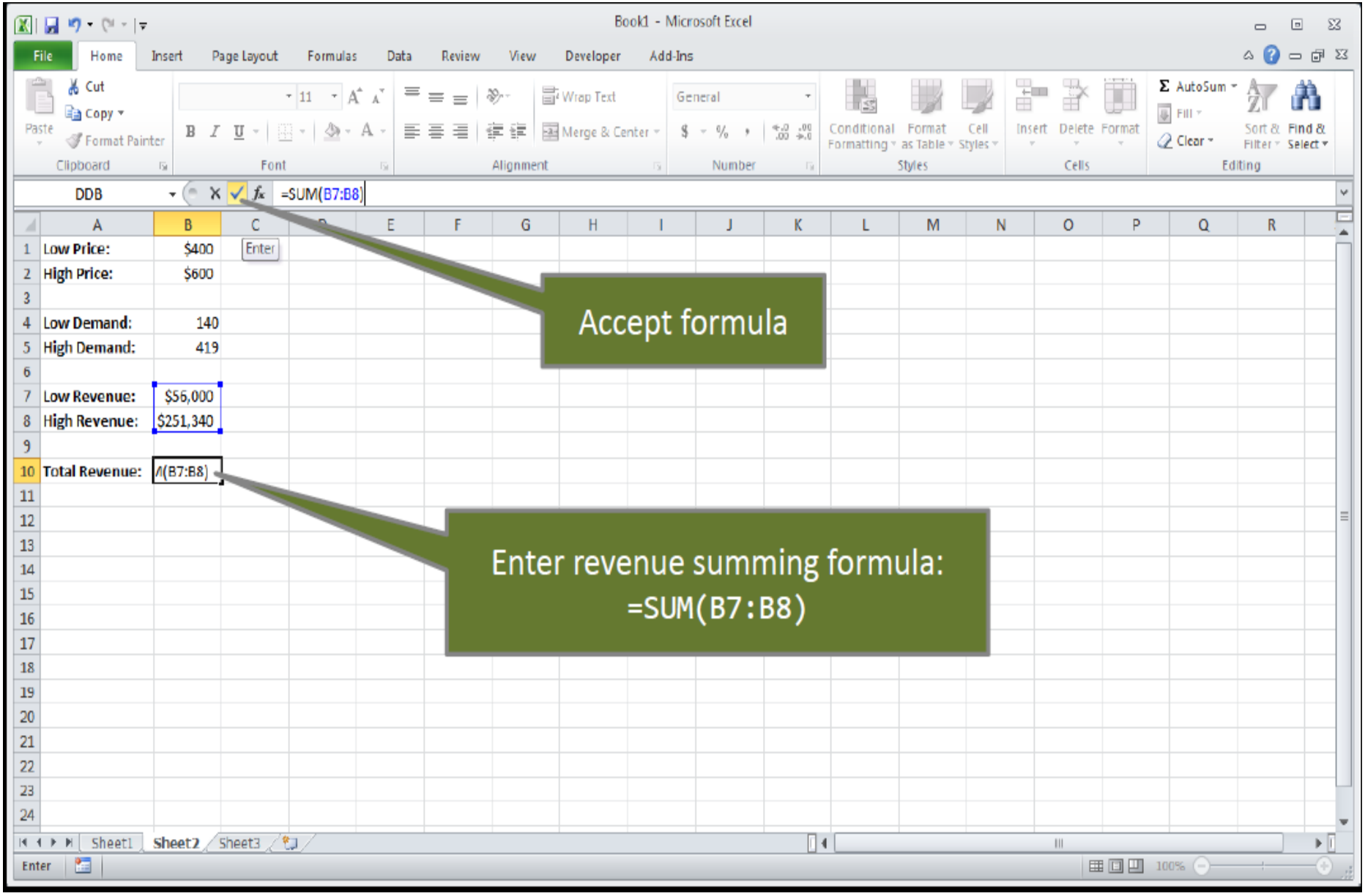


# Revenue Analytics



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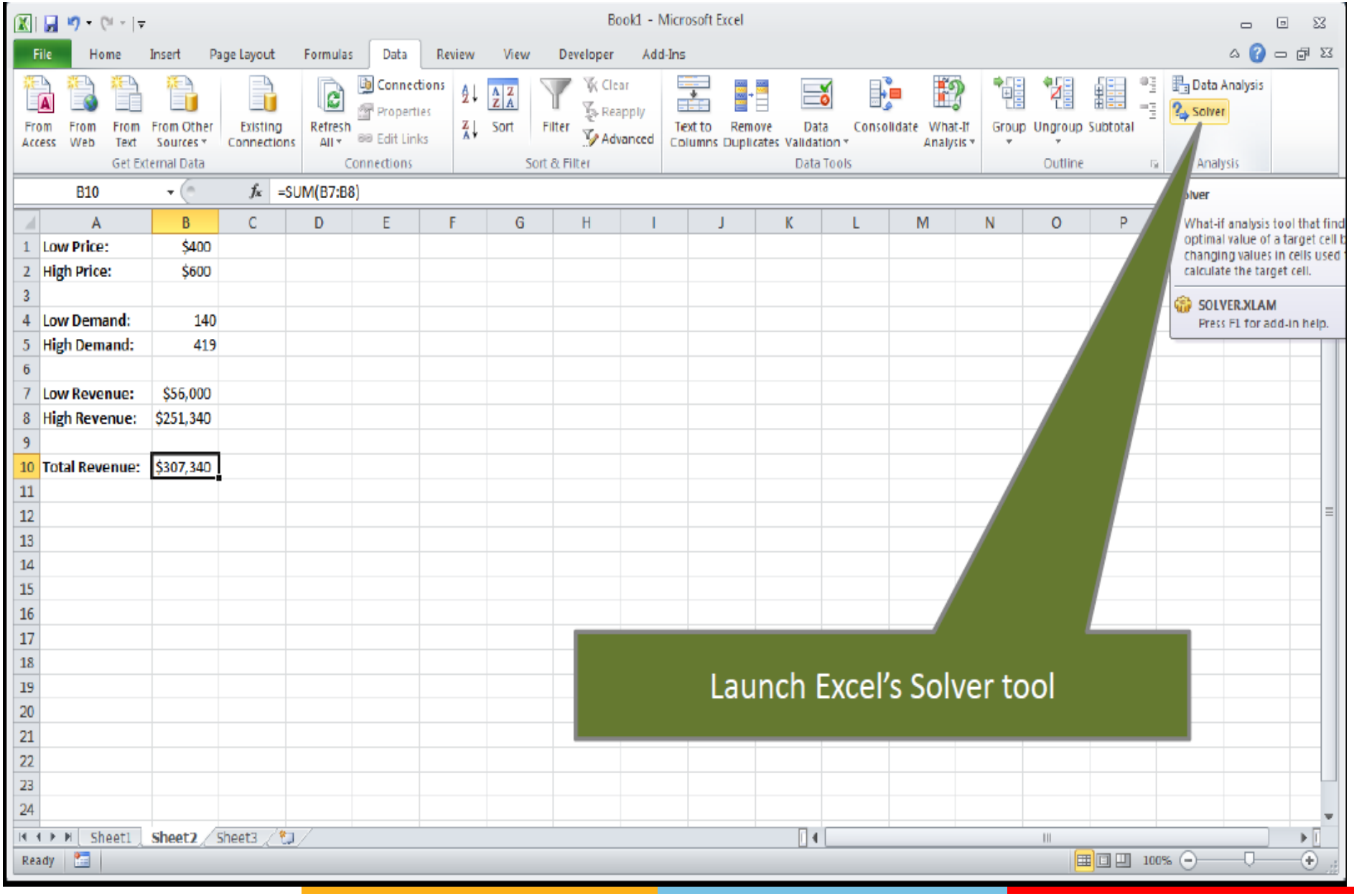
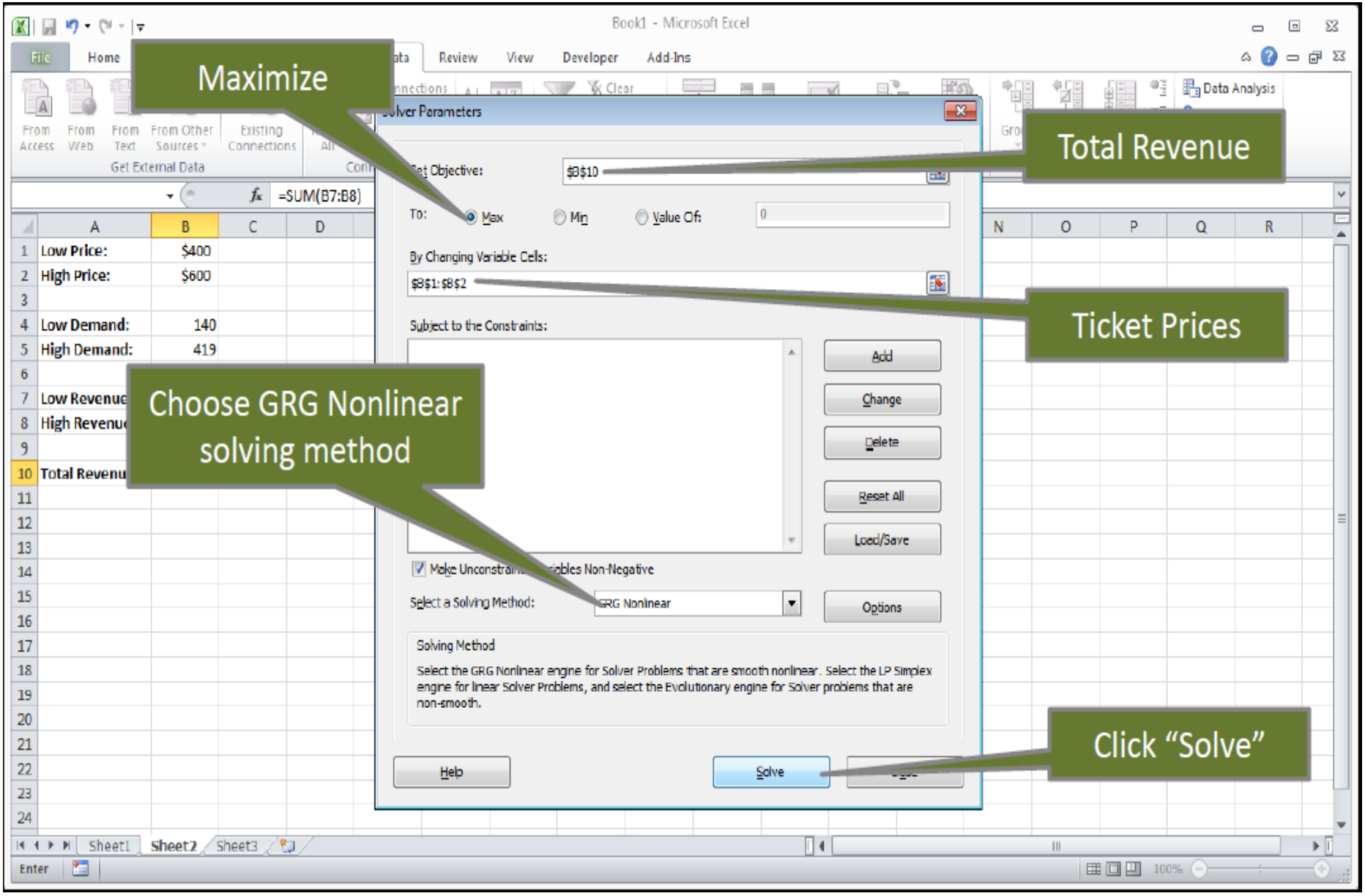


# Revenue Analytics



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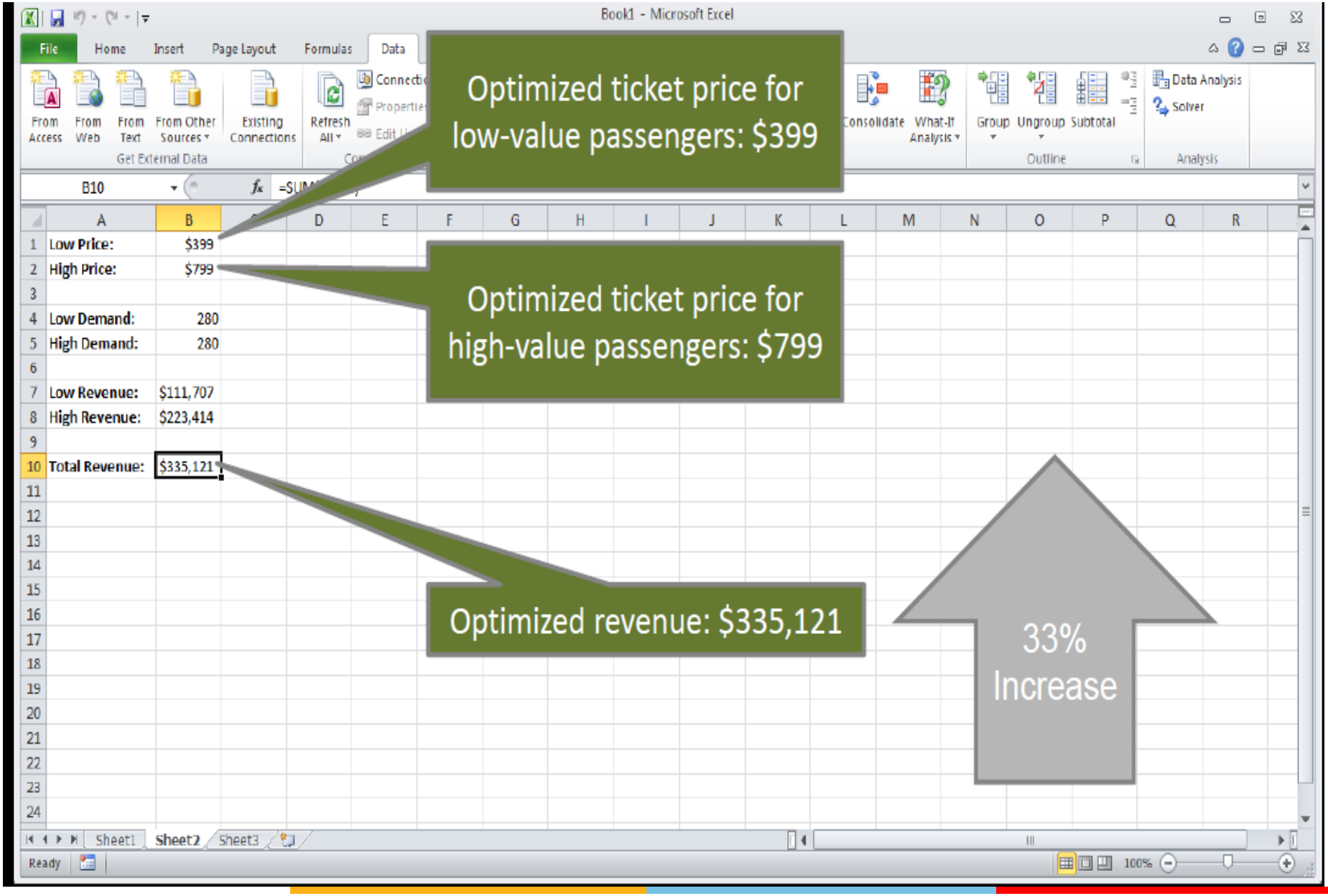
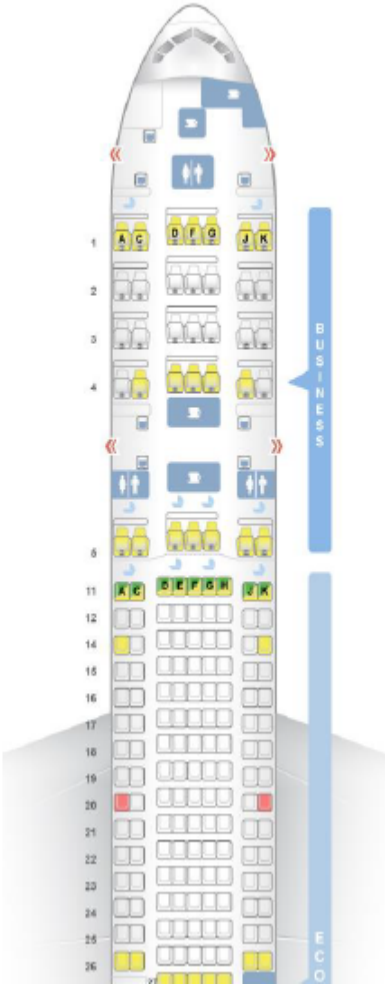


# Revenue Analytics

## 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



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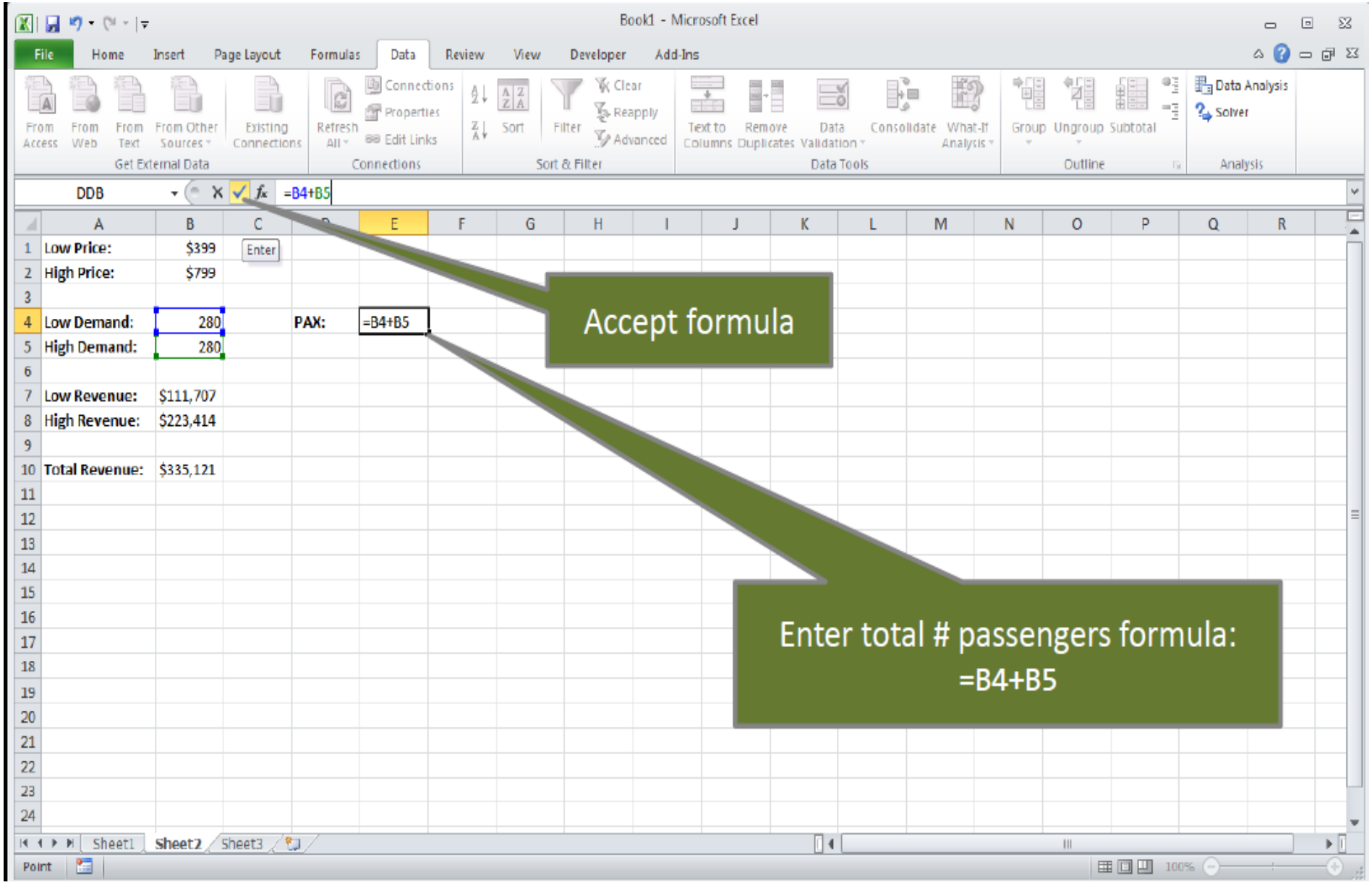

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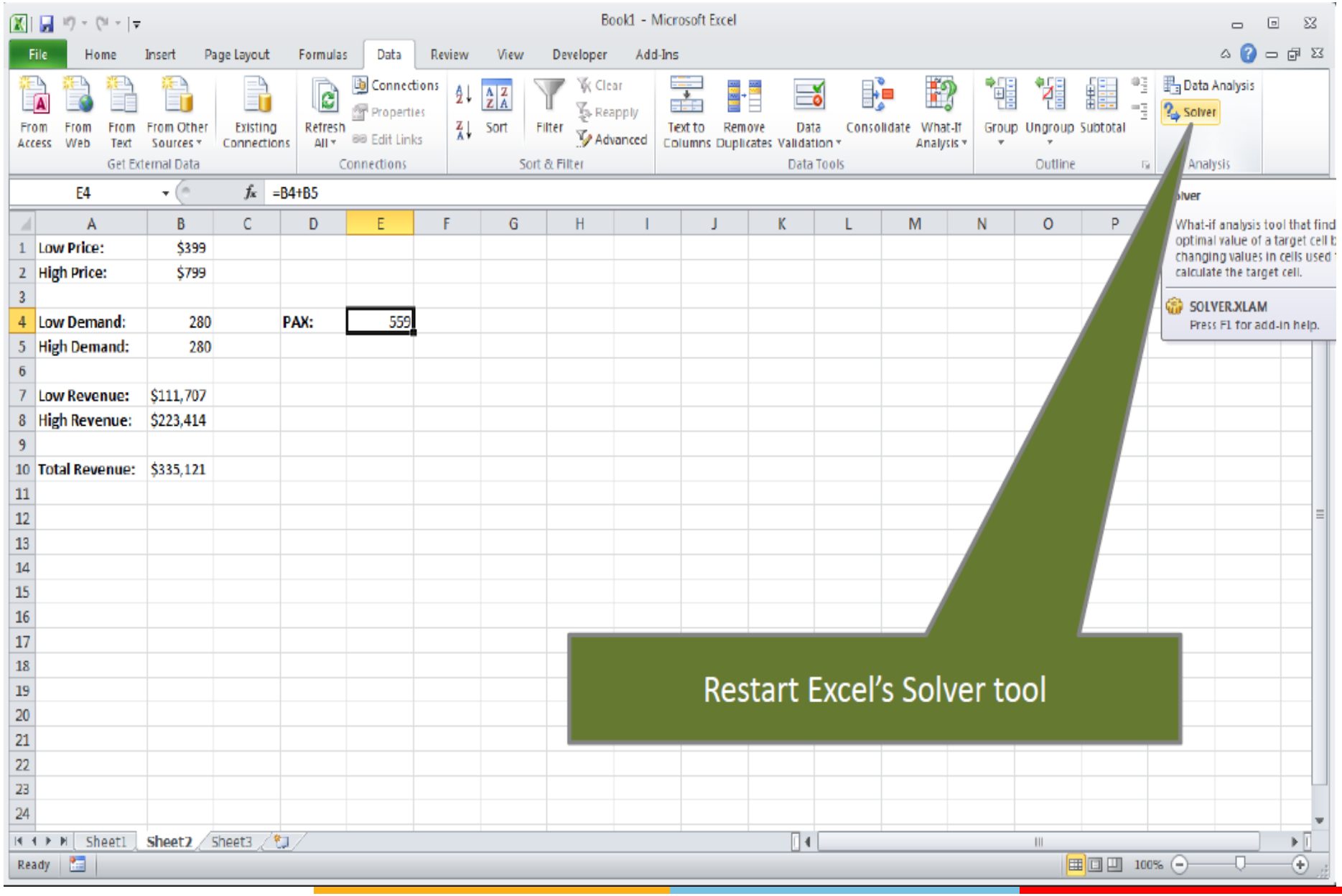

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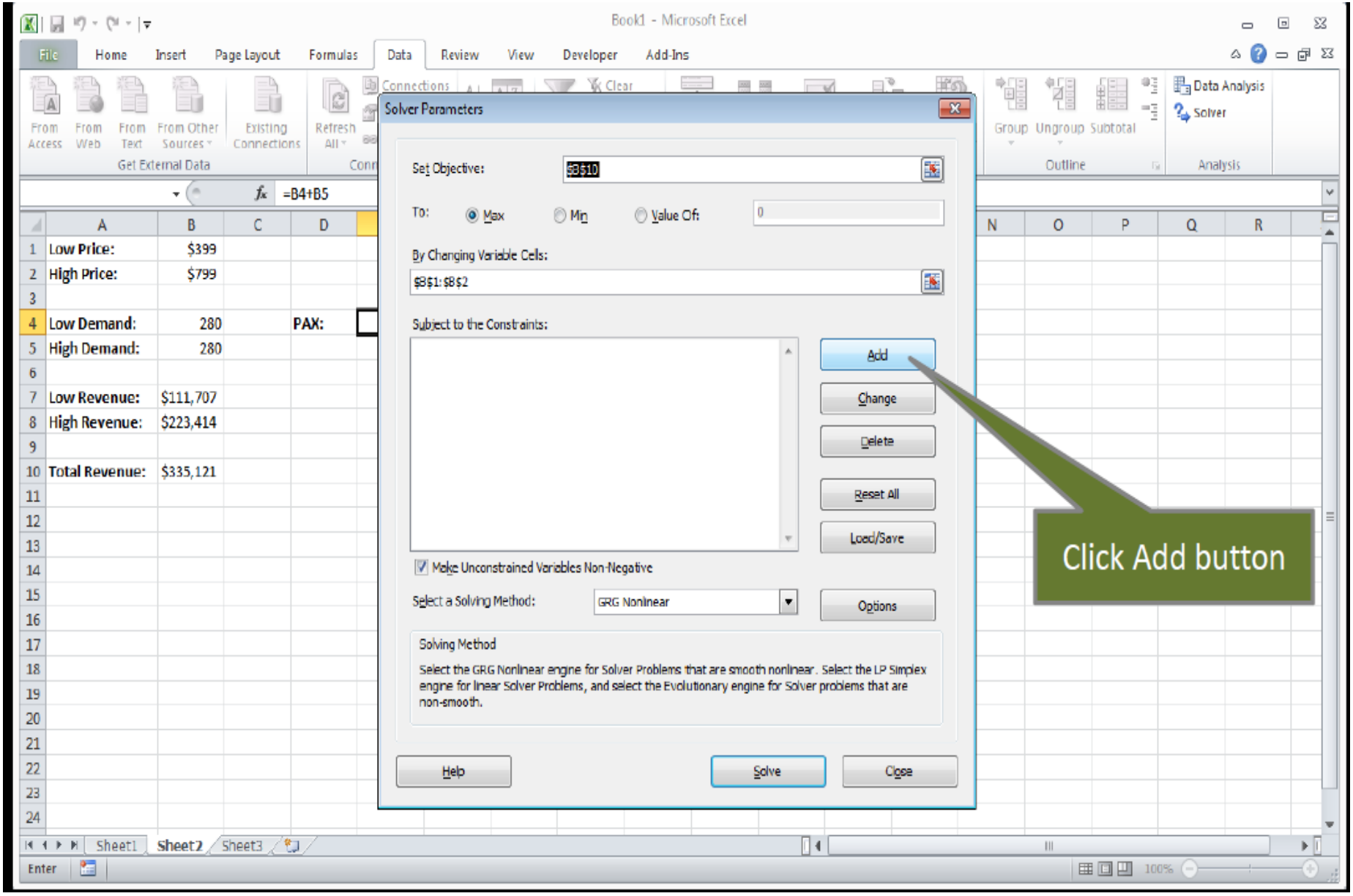

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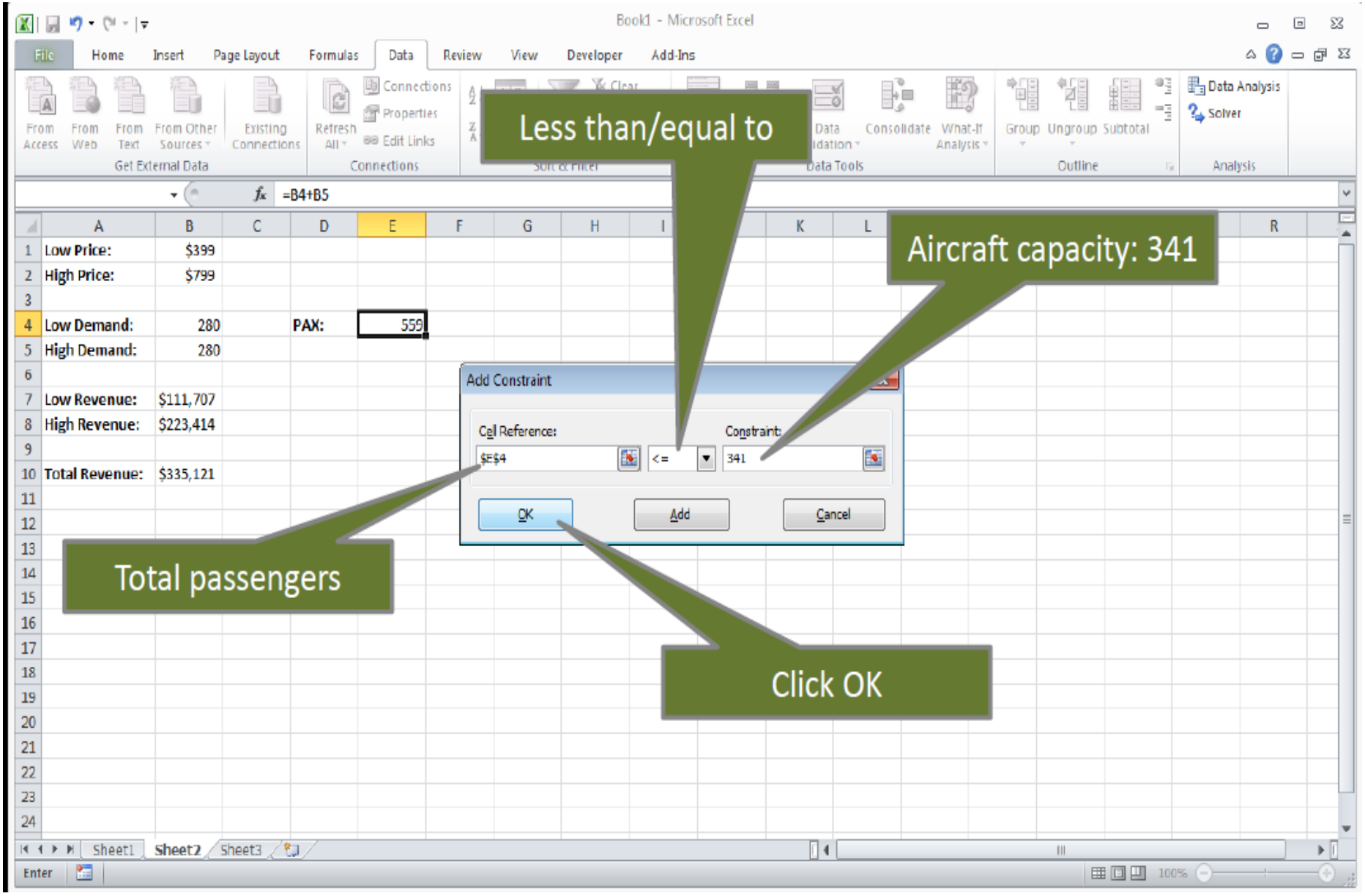

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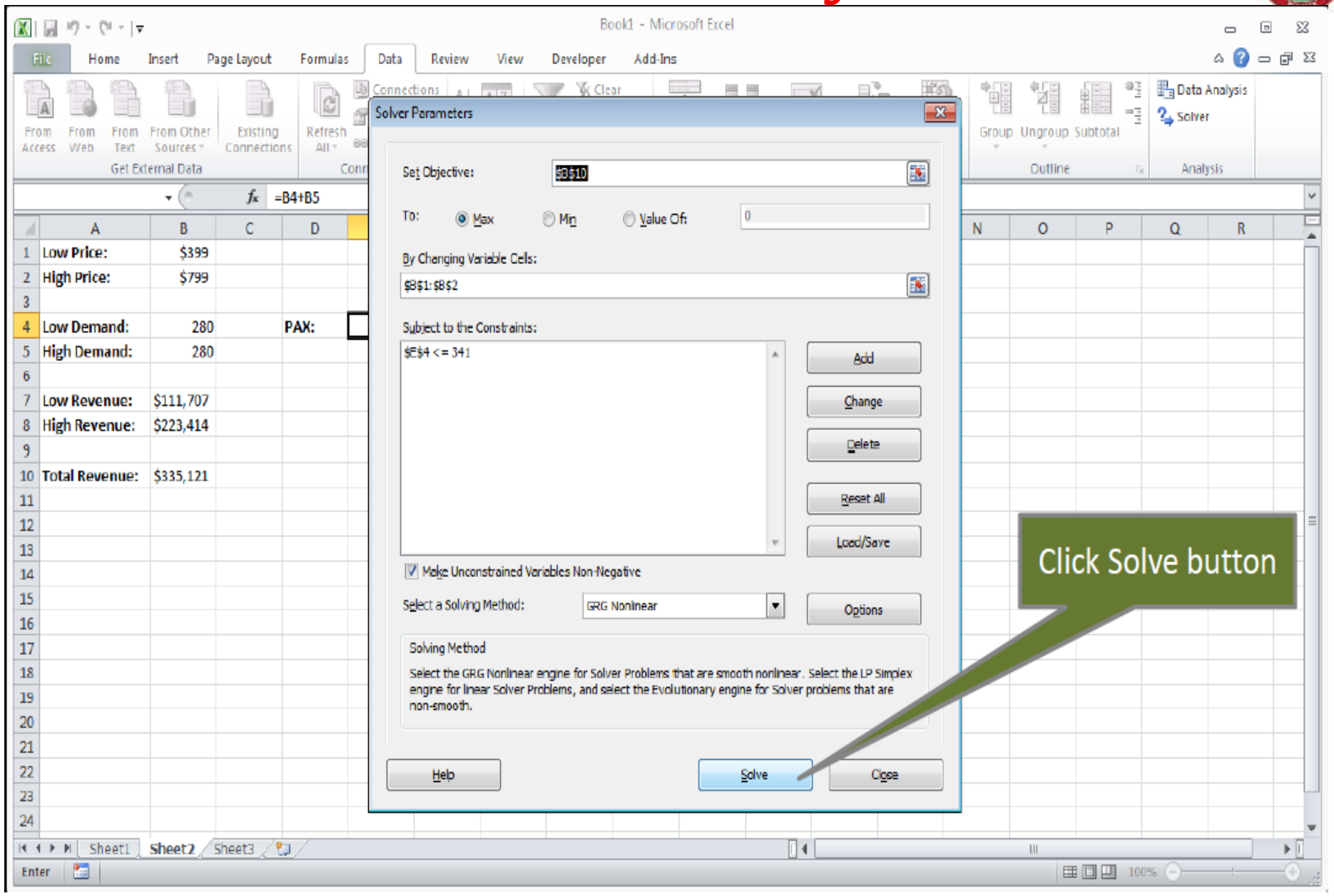

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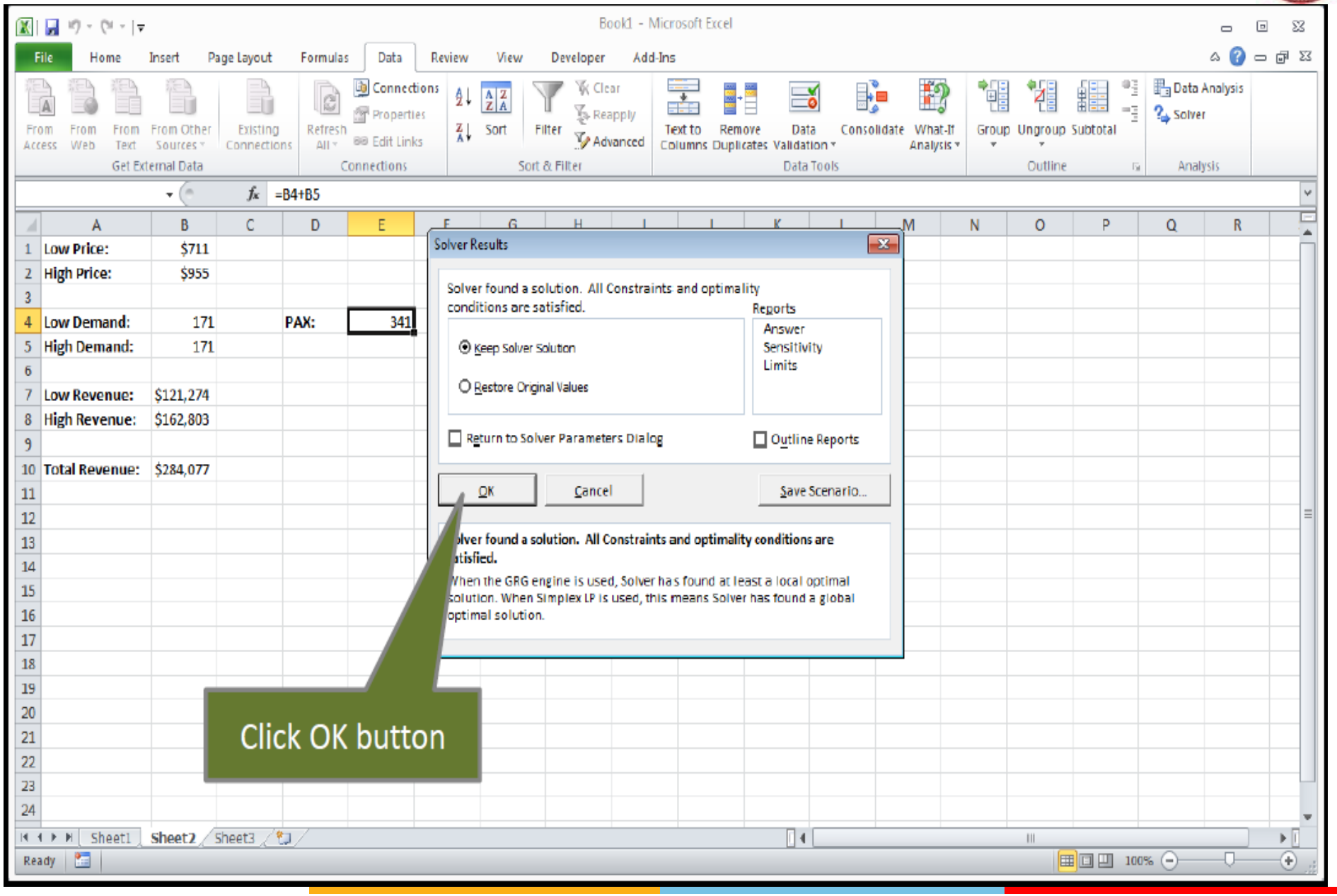

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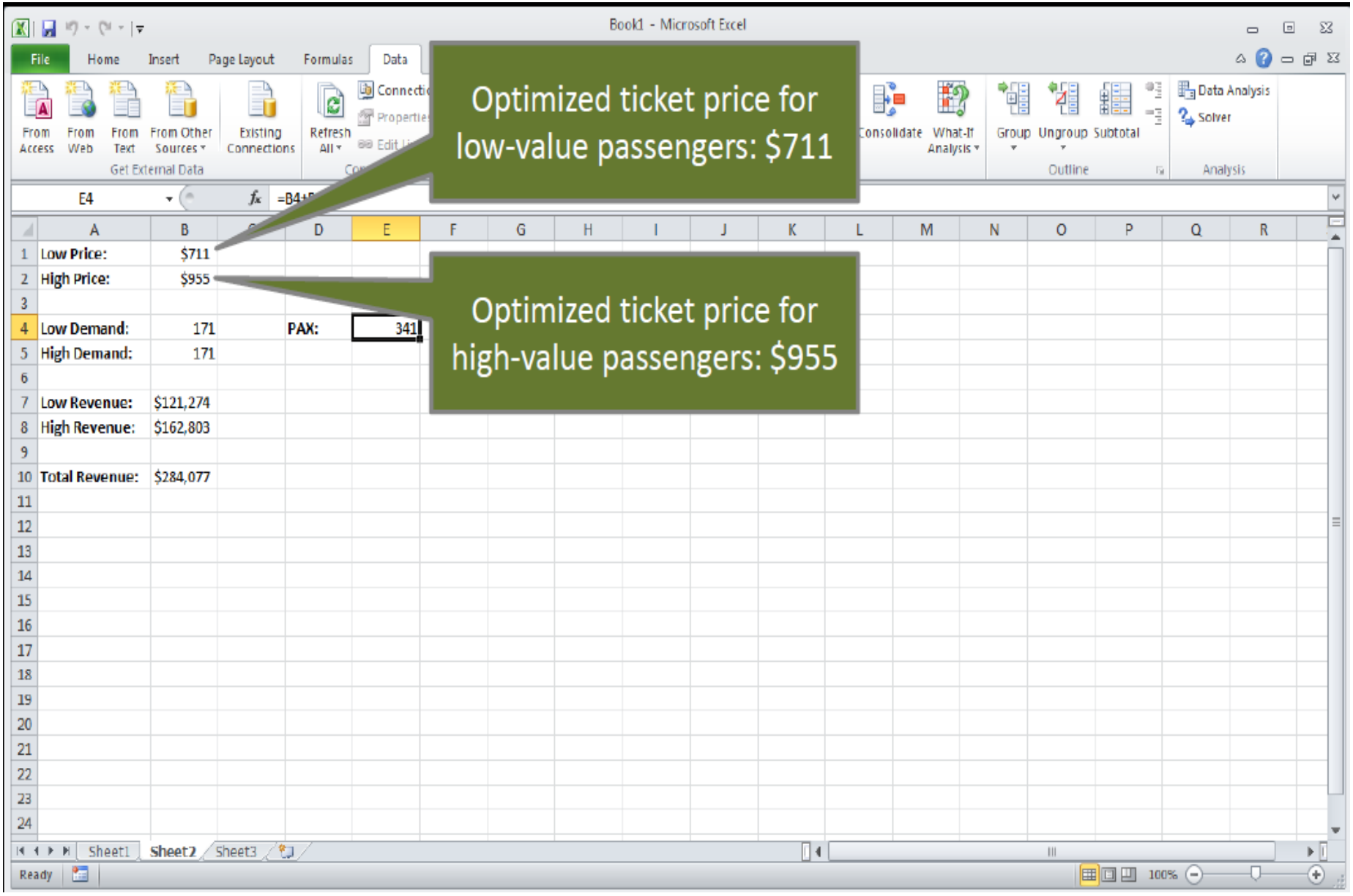

# Thank you !!!