CS101 Introduction to Computing

Lecture 22

Spreadsheets

Focus of the 14th Lecture was on Word Processing

- It was the first among the four lectures that we plan to have on productivity software
- We learnt about what we mean by word processing and also desktop publishing
- We also discussed the usage of various functions provided by common

Today's Lecture: Spreadsheets

- Second among the four lectures that we plan to have on productivity software
- This 2nd lecture is on spreadsheets
- We'll learn about why we are interested in spreadsheets
- We'll discuss the several common functions provided by popular spreadsheet SW programs

Business Plan for a New Software Development Company

The information provided in this business plan is confidential. Please do not disclose it without checking with me first. Thanks.

Sales Forecast

All currency figures are in thousands of US Dollars

	1st Year	2nd Year	3rd Year	4th Year	5th Year
Billing Schedule					
Lahore	20x42x0.5 420	30x96 2,880	40x169 6,760	50x317 15,850	60x490 29,400
Dubai		60x15x0.5 450	70x35 2,450	80x45 3,600	90x50 4,500
Islamabad			40x25x0.5 700	50x60 3,000	60x100 6,000
Karachi				50x45x0.5 1,125	60x100 6,000
Total	**420**	**3,330**	**9,910**	**23,575**	**45,900**
Costs for the Development Workforce					
Lahore	15x42x0.8 504	17x96 1,632	20x169 3,380	24x315 7,608	28x490 13,720
Dubai		48x15x0.8 576	57x35 1,995	66x45 2,970	78x50 3,900
Islamabad			20x35x0.8 560	24x60 1,440	28x100 2,800
Karachi				24x45x0.8 864	28x100 2,800
Total	**504**	**2,208**	**5,935**	**12,882**	**23,220**
Costs for the Sales and Support Workforce					
Singapore	120x2 240	110x3 390	110x4 440	110x5 550	125x5 625
Wash., DC	200x3 600	180x10 1,800	180x20 3,600	180x30 5,400	190x40 7,600
Chicago		210x2 420	200x3 630	200x4 800	200x5 1,000
Total	**840**	**2,610**	**4,670**	**6,750**	**9,225**
Costs for the Corporate Office					
Corporate	40x3 120	42x4 168	44x6 264	46x8 368	48x10 480
Total	**120**	**168**	**264**	**368**	**480**
Profit	**(1,044)**	**(1,656)**	**(959)**	**3,575**	**12,975**
P/S	**-249%**	**-50%**	**-10%**	**15%**	**28%**

NPV Discount Rate	**17%**
NPV @ that Discount Rate	**5,125**
IRR	**68%**

Spreadsheets

- Electronic replacement for ledgers
- Used for automating engineering, scientific, but in majority of cases, business calculations
- A spreadsheet - VisiCalc - was the first popular application on PC's.
- It helped in popularizing PC's by making the task of financial-forecasting much simpler, allowing individuals to do forecasts which previously were performed by a whole team of financial wizard

What Can They Do? (1)

- Can perform calculations repeatedly, accurately, rapidly
- Can handle a large number of parameters, variables
- Make it easy to analyze what-if scenarios for determining changes in forecasts w.r.t. change in parameters

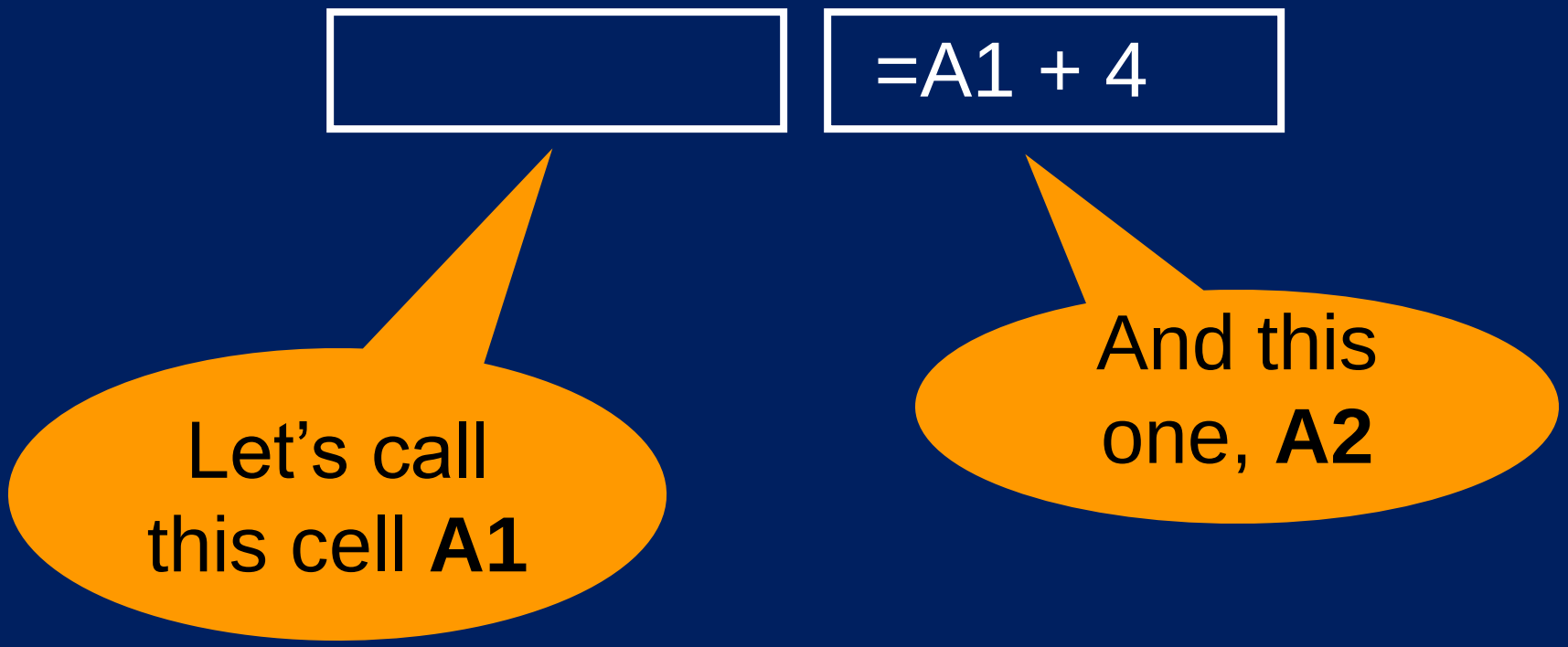
What Can They Do? (2)

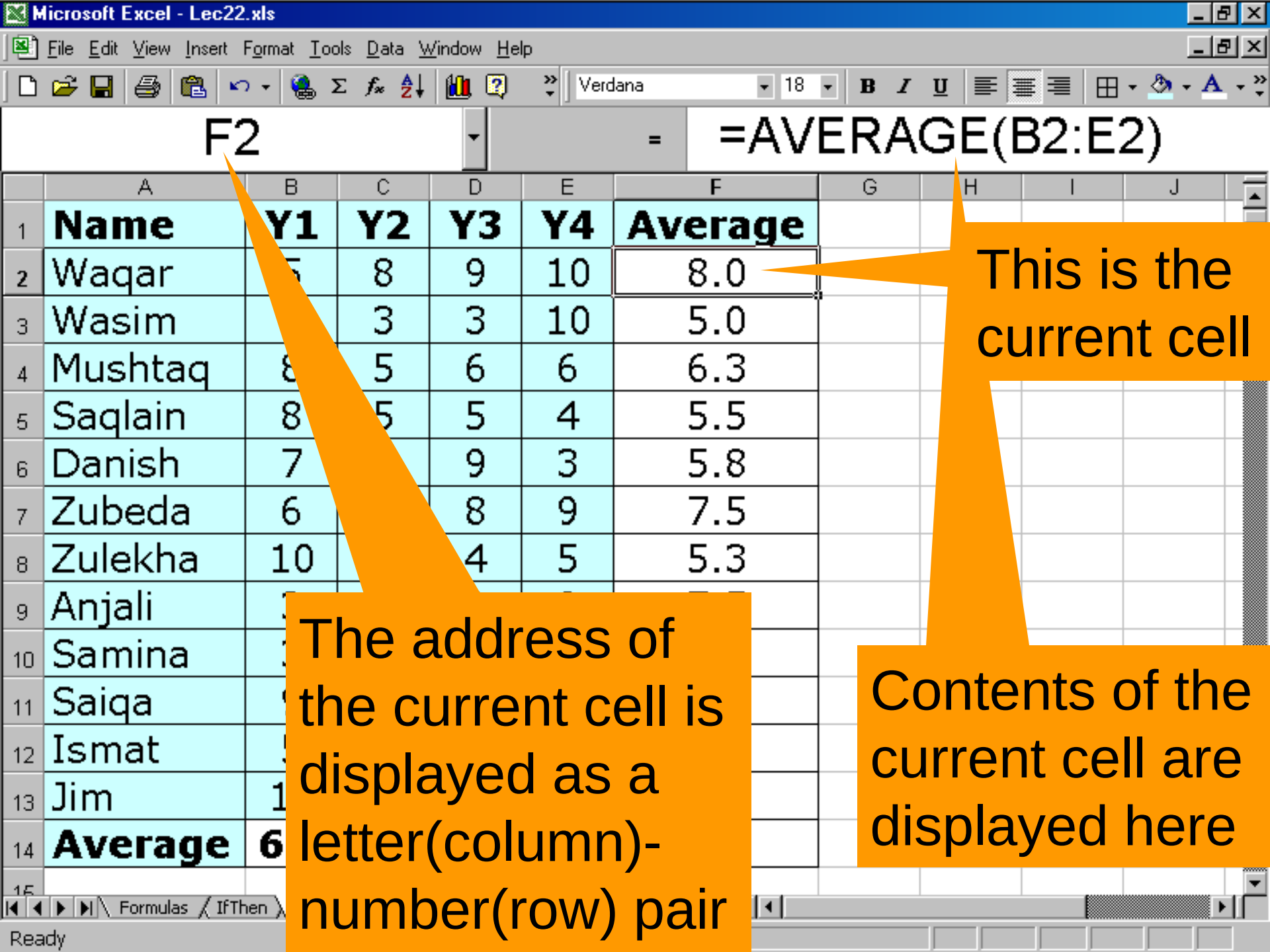
- Are easy to interface with other productivity SW packages
- Easy to store, recall, modify
- Make it is easy to produce graphs:
  - Graphs reveal the knowledge contained in data with greater clarity and ease as compared with data arranged in rows and columns
  - Modern spreadsheet programs can be used to display data in a variety of graphical formats

The Structure of A Spreadsheet

- Collection of cells arranged in rows and columns
- Each cell can contain one of the following:
  - Numbers
  - Text
  - Formulas
- These cells display either the number or text that was entered in them or the value that is found by executing the formula

Connecting Two Cells




Microsoft Excel - Lec22.xls
File Edit View Insert Format Tools Data Window Help
Verdana 18
F2
=AVERAGE(B2:E2)
Name Y1 Y2 Y3 Y4 Average
Waqar 8 9 10 8.0
Wasim 3 3 10 5.0
Mushtaq 5 6 6 6.3
Saqlain 5 5 4 5.5
Danish 9 3 5.8
Zubeda 8 9 7.5
Zulekha 4 5 5.3
Anjali
Samina
Saiqa
Ismat
Jim
Average
Formulas IfThen
Ready
This is the current cell
Contents of the current cell are displayed here
The address of the current cell is displayed as a letter(column)-number(row) pair

What-If Analysis

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a graphic worth

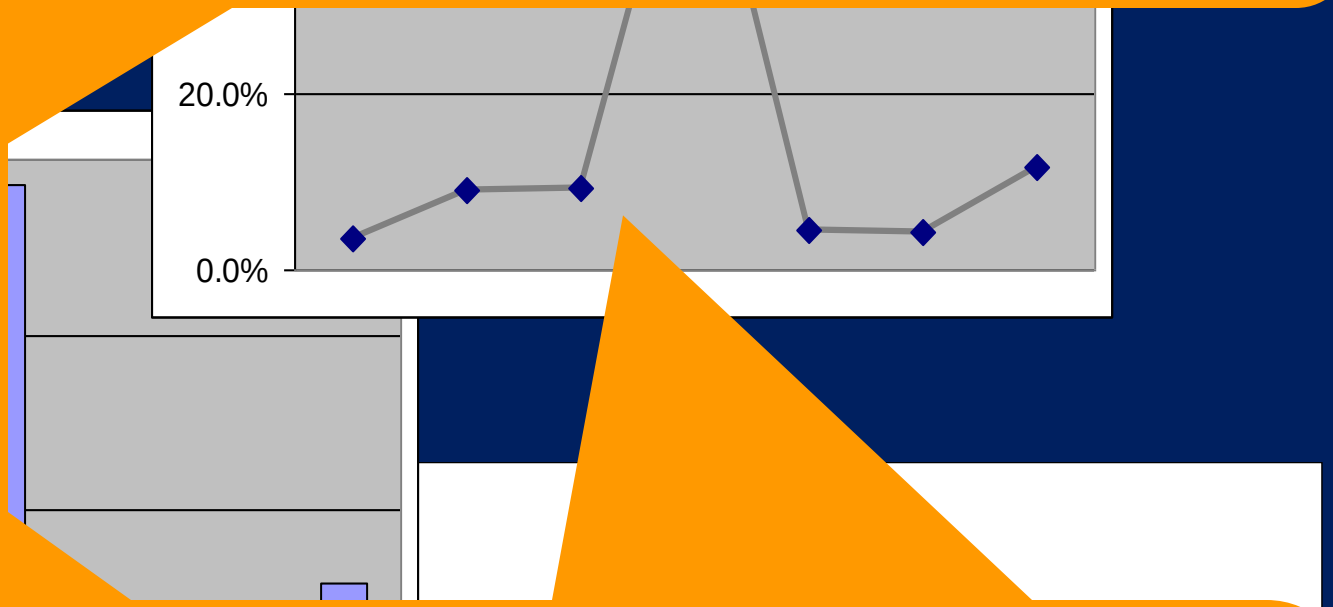
a thousand acres ...

Distribution of Expenses Required for Running a Call Center in the US

Software	3.6%
Hardware	9.2%
Telecom Charges	9.3%
Salary & Benefits	57.2%
Recruitment & Training	4.6%
Building Rent	4.4%
Other	11.7%
	100.0%

Pie charts are great for showing parts of a whole that are generally expressed in percentages. They work best for a small number of categories

ork well for comparing several
ategories with one another or
d over several time increments



so work well for displaying
They're better than bar
are a large number of data points
one congruent trends are being

Goal Seek

Goal Seek

Goal Seek in Excel

When you use the Goal Seek command, Excel changes the value in one cell until the value in a second cell reaches a number that you desire. For instance, if you had a spreadsheet that calculated profit for the Bhola eService from a variety of inputs, including employee numbers, expenses, products sold, price of products, you might use goal seek to define your break-even price of products. You would tell the computer to change price of products until Profit was zero (break-even), and you would do that using Tools, Goal Seek.

To use Goal Seek, go to the Tools command. If Goal seek . . . is not an option, you must first go to Add-ins (also under Tools), and select Goal Seek. Once Goal Seek is loaded, choose it under Tools.

In Goal Seek there will be three boxes to fill in.

1. The first says "Set cell." Enter the cell address (or click on the cell) of the cell whose value you want to fix or set to a specific number (i.e. Profit cell). This cell must contain a formula or function. Otherwise it will not be linked to the cell you will be changing to obtain zero profit.
2. The second says "To value." Enter the appropriate value you wish to see in that "Set" cell (i.e. 0 if you want the Profit to come out zero).
3. The third says "By changing cell." Enter or click on the cell you want Goal Seek to change to obtain the zero profit. (i.e. milk price). This cell must not be a formula or function. Then click "okay."

At this point Goal Seek will show you the answer. For instance, Profit will now be zero and the Milk Price cell will have changed to another price (maybe 11.86) to make Profit=0. You can accept the change or you can cancel the Goal Seek and return to the previous numbers. Often you just want to take note of the new numbers and cancel. If you accept and change your mind, click Undo.

Things that you must remember!!

- Make sure the "Set Cell" cell is a formula or function or cell reference.
- Make sure you have set that sell to a reasonable number.
- Make sure the "By Changing Cell" cell is a number or blank, and not a formula, function or cell reference like =C5.
- Make sure there is a link by formulas between the two cells you entered in the Goal Seek. However complicated the link might be, they must be related for the Set cell to be changed by the Change cell.
- Finally, make sure your formula in the "Set Cell" cell is correct (as well as all others).

Simple Example

Assume the following cells. We will use Goal Seek to find a number to make the sum=150.

A2 = 25
A3 = 40
A4 = SUM(A2:A3) which is showing 65

In Goal Seek:

- Set Cell: click on A4
- To Value: enter 150
- By Changing Cell: click on A3

The sum in A4 should now be 150, and A3 should have become 125 for that to happen.

•We can also use Goal seek functionality to solve mathematical equation.

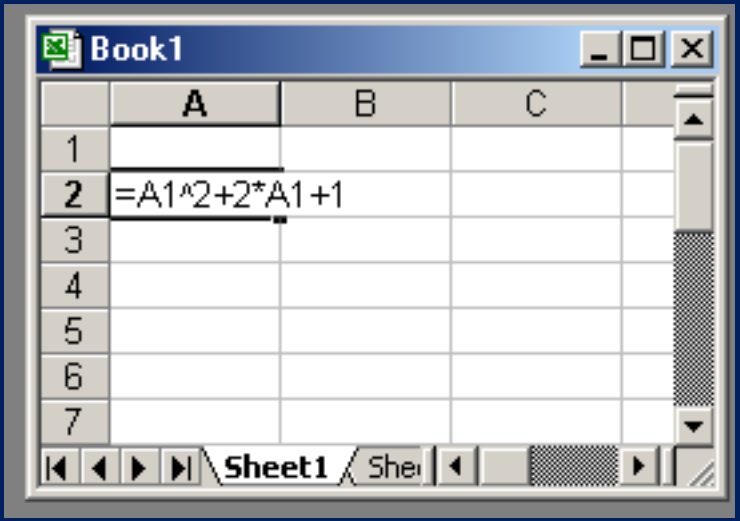
$$f(x) = x^2 + 2x + 1 = 0$$

$$f(x) = x^4 + 5x^3 + 9x^2 + x - 5 = 0$$

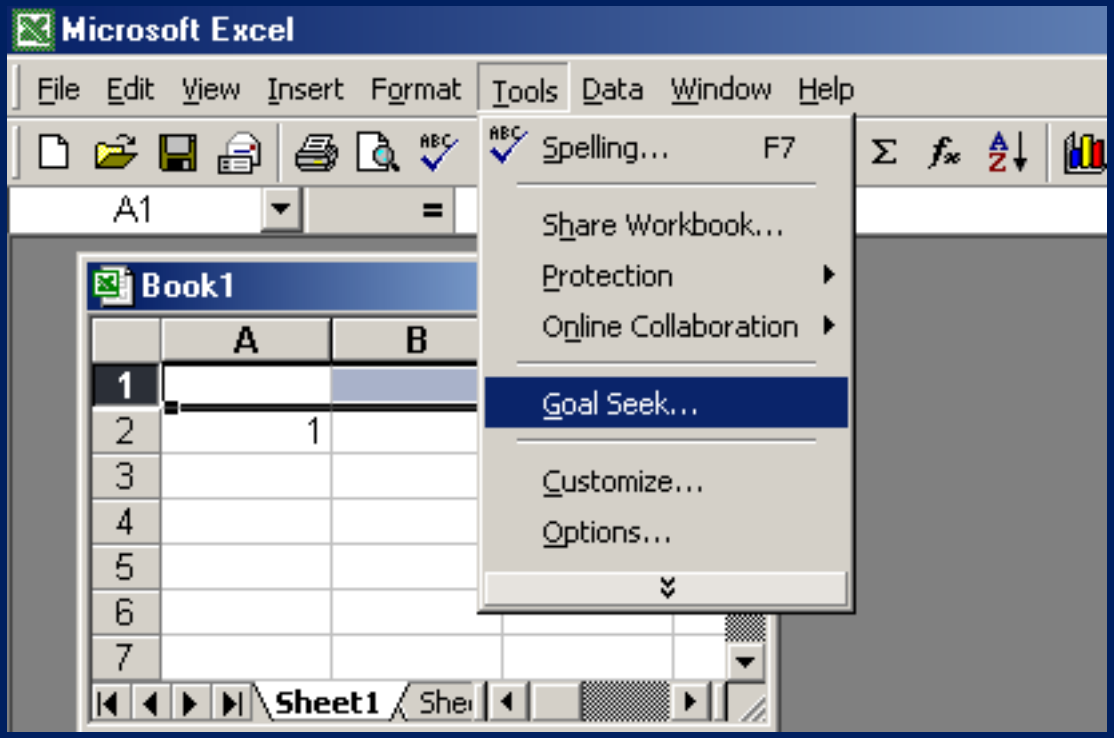
Let us now try to solve the first equation through goal seek

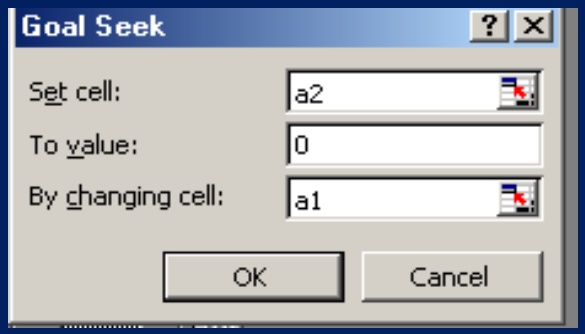
Solving Equation: $f(x) = x^2 + 2x + 1 = 0$

- Write the formula in a cell e.g. A2

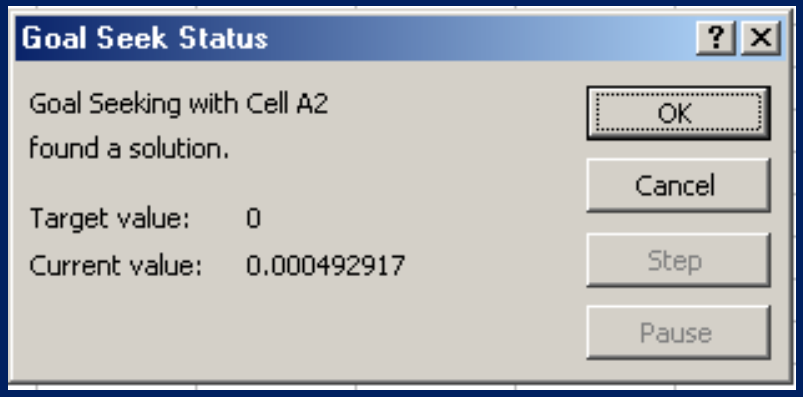


- Select the goal seek option



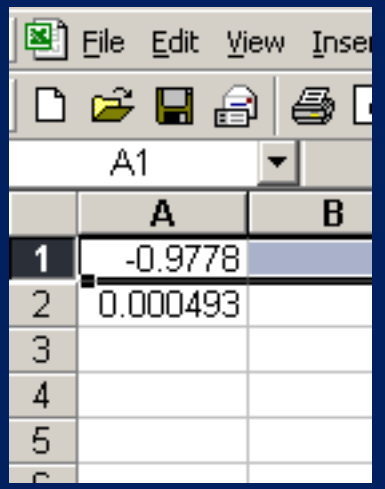


- In the ‘set cell’ input field write the cell number that needs to be changed I.e. a2
- In the ‘to value’ field enter the value we want the cell a2 to have i.e. 0
- In the ‘by changing cell’ field enter the number of the cell we used as a variable I.e. a1
- On pressing the ok button the following box appear



- This shows the that the target was to have 0 value but excel could calculate for 0.0004 value
- On pressing Ok we will get->
- Here the value of a1 is

–0.97 which is almost equal to -1



- Hence to get the value of the given function as 0 the value of x should be 1

- Which is the solution of the equation

$$f(x) = x^2 + 2x + 1 = 0$$

links

- Following are some urls for the goal seek ;
  - http://www.ootraining.com/QwikAndDirty/QwikAndDirtyExcelWeb/DataAnalysis/Using_Goal_Seek/Using_Goal_Seek.htm

The Best Feature: Undo

- Allows you to recover from your mistakes
- Allows you to experiment without risk

Getting On-Screen Help

- All spreadsheets generally have some form of built-in help mechanism
- To me, it seems like that many of those help-systems are designed to be “not-very-helpful”: they make finding answers to simple questions quite difficult
- Nevertheless, do try them when you are searching for answers

I'll now demonstrate the use of spreadsheets with the help of several examples

- Formulas
- Sorting
- Conditional formatting
- Graphs
- Goal seek

Document-Centered Computing

Assignment # 8A

You will be given a list of the minimum and maximum temperature readings taken on 9 Apr ’02 in 37 cities

- Calculate the average maximum and minimum temperatures and display them in B38 and C38
- Sort the cities in *ascending* order w.r.t. the minimum temperature
- Take the sorted list & draw a bar-graph displaying each city (x-axis) along with the min. temp. (y-axis)
- Display a count of cities having minimum temperatures between 50 and 60 in B39
- Display the average minimum temperature of the 10 hottest cities in B40

Assignment # 8B

$$f(x) = x^6 + x^4 + 5x^3 + 9x^2 + x - 5 = 0$$

Find at least two values for x that satisfy this equation using the *Goal Seek* feature in Excel. Store the result for x in C41 and store the $f(x)$ function in cell B41

Consult the CS101 Web page for the further instructions and information about the deadline

Today's Lecture was the …

- Second among the four lectures that we plan to have on productivity software
- This 2nd lecture was on spreadsheets
- We learnt about what we mean by spreadsheets
- We discussed the usage of various functions provided by common spreadsheets

Focus of the Next Productivity SW Lecture: Presentations

- To become familiar with the basics of multimedia presentations
- To become able to develop simple presentation with the help of presentation software