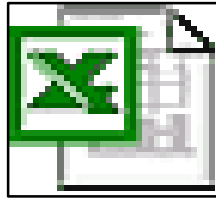


Mathematics LBS 5

Spreadsheet Mathematics: Statistics and Graphing

Lab 3: Measures of Central Tendency & Dispersion

Microsoft Excel Logo and all screens captured by permission of Microsoft



Goal To use Excel to find the Mean, Median, Mode, Range, Variance and Standard Deviation of a set of data.

Learning Outcomes After completing this section, the student should be able to

- enter data onto an Excel spreadsheet
- use the "Paste Function" to find the Mean, Median, Mode, Range, Variance and Standard Deviation of a set of data
- use the "Data Analysis" tool to obtain complete summary of the descriptive statistics of a set of data
- save the spreadsheet for further analysis

Prior Learning Before attempting this unit it is expected that the student has

- completed Lab 1 of "Spreadsheet Math" and/or knows how to enter and format data in an Excel Spreadsheet
- completed the Statistics Module in LBS-5 Mathematics
- learned how to calculate the mean, median, mode, range, variance, and standard deviation by hand

Contents

- Review of Measures of Central Tendency
- Using Excel to sort data
- Using Excel's "Paste function" to find Mean, Median, and Mode
- Using the Data Analysis Tool to obtain a summary of Descriptive Statistics.
- Hand - in Assignment

Spreadsheet Math

Lab 3: Finding the Mean, Median, Mode, Range, Variance and Standard Deviation

New Words: Sort, Autosum (Σ), Paste Function (f_n) and Data Analysis

Review of Measures of Central Tendency

Mean:

The arithmetic mean is the most common measure of central tendency used to describe a set of data. More commonly known as the average it is found by adding the values of the data and dividing by the number of data.

Median:

The median is a measure of central tendency that describes the middle of the set of data. It is found by arranging values in order from smallest to largest and locating the middle figure.

Mode:

The mode is the most frequently occurring value in a set of data.

Using Excel to Sort and Analysis Data

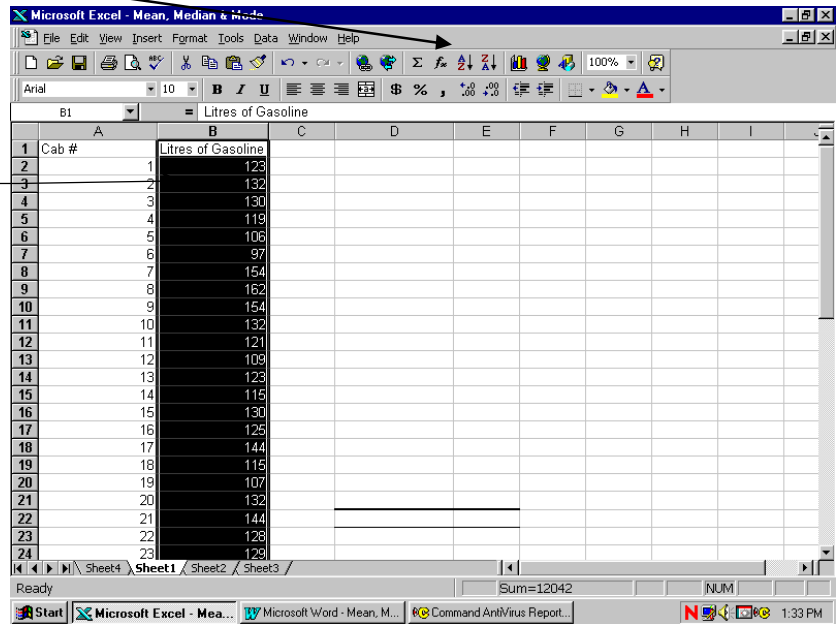
1. A large taxicab company has a fleet of 45 cabs. The following are the number of litres of gasoline each cab used last month.

123	132	130	119	106	97	154	162	154	132	121	109
123	115	130	125	144	115	107	132	144	128	129	113
129	99	122	139	123	125	115	145	150	142	119	145
139	141	146	132	127	122	106	135	149			

2. Open **Excel**. (See Lab 1 if you have forgotten how to open **Excel**)
3. Enter the above data into your worksheet, using Column A for the cab # and column B for the # of litres of gasoline. (see sample below). Check to see that you have entered the data exactly as given. Edit any cell if necessary.
4. In order to better organize and describe your data it is best to rearrange your data and list values in order from smallest to largest. **Excel** will do this for you. First, select the data you wish to **sort**. (B2:B46).
5. Then **Click on** the **sort** button $\left[\begin{array}{c} \text{A} \\ \text{Z} \end{array} \downarrow \right]$ on the tool bar . Note what happens to your values.

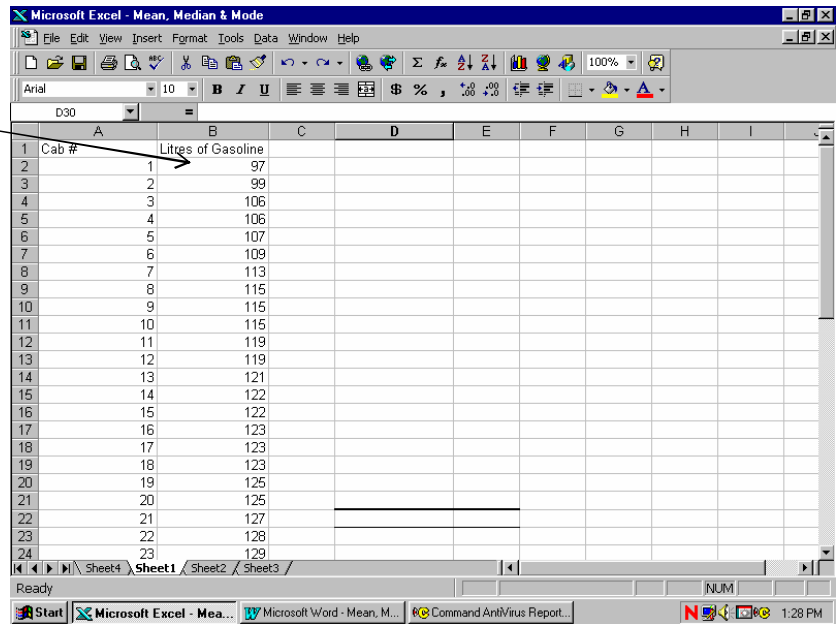
Sort Data A to Z

Select Data B2:B46



Data will be arranged from smallest to largest value.

Numbers are arranged smallest to largest



Descriptive Statistics

Once the data is arranged from smallest to largest, it is easier to describe it.

We can pick out the smallest number. **The minimum value** is 97.

The largest value or the **maximum value** is 162.

The range of the data is $162 - 97 = 65$

Measurements of Central Tendency

The Median: Since there are 45 cabs the middle number will be the 23rd. value. By looking at the sorted data we know that the **median** is 129.

The Mode: is the value that occurs most frequently. By looking at the sorted data we see that 132 occurs 4 times. Therefore the **Mode** is 132.

The Mean: The mean or average can be found by adding the values and dividing by 45. Excel has an **Autosum (Σ) button** that will automatically add a column of numbers and place the total at the bottom. To find the total go to **cell B47**, then **Click on the autosum button**. The numbers to be added will appear **(B2:B46)**. **Click again** and the total will appear in cell **B47**. You can divide this total by the number of pieces of data, 45, to find the **mean = $5794 \div 45 = 128.76$**

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

Row	Value
26	25
27	26
28	27
29	28
30	29
31	30
32	31
33	32
34	33
35	34
36	35
37	36
38	37
39	38
40	39
41	40
42	41
43	42
44	43
45	44
46	45
47	Total =SUM(B2:B46)

Callouts in the image:

- A box labeled "Autosum (B2:B46)" points to the Autosum button in the Excel toolbar.
- A box labeled "Active Cell B47" points to cell B47, which contains the formula =SUM(B2:B46).

Using Excel's Paste Functions (f_n) to Find Mean, Median & Mode

Select a cell in which you wish to print the mean. (Click on cell B49 to make it active.)

- 1 **Click on the Paste Function (f_n)** button on the toolbar. A window will open.
- 2 Select **statistical** in the left column and **average** in the right column. Then **Click OK**. Another window will open in which you can select the data you want to find the mean for.
- 3 Make sure that you have included all the data and only the data (Do not include the total) **Select B2 : B46**. **Click OK**. The average should appear in the active cell **B49**.
- 4 **Repeat** the above steps to find the **Median, Mode and Standard Deviation (STDEVP)**. Make sure you first select an empty cell in which to print each of these statistics and label them.

Using Excel's Paste Function:

The screenshot shows the Microsoft Excel interface with a data table and the Paste Function dialog box open. The data table has the following values:

	A	B	C	D	E	F	G	H	I	J
30		29	132							
31		30	132							
32		31	135							
33		32	139							
34		33	139							
35		34	141							
36		35	142							
37		36	144							
38		37	144							
39		38	145							
40		39	145							
41		40	146							
42		41	149							
43		42	150							
44		43	154							
45		44	154							
46		45	162							
47	Total		5794							
48										
49	Mean	=								
50	Mode									
51	Median									
52	Standard Deviation									
53										

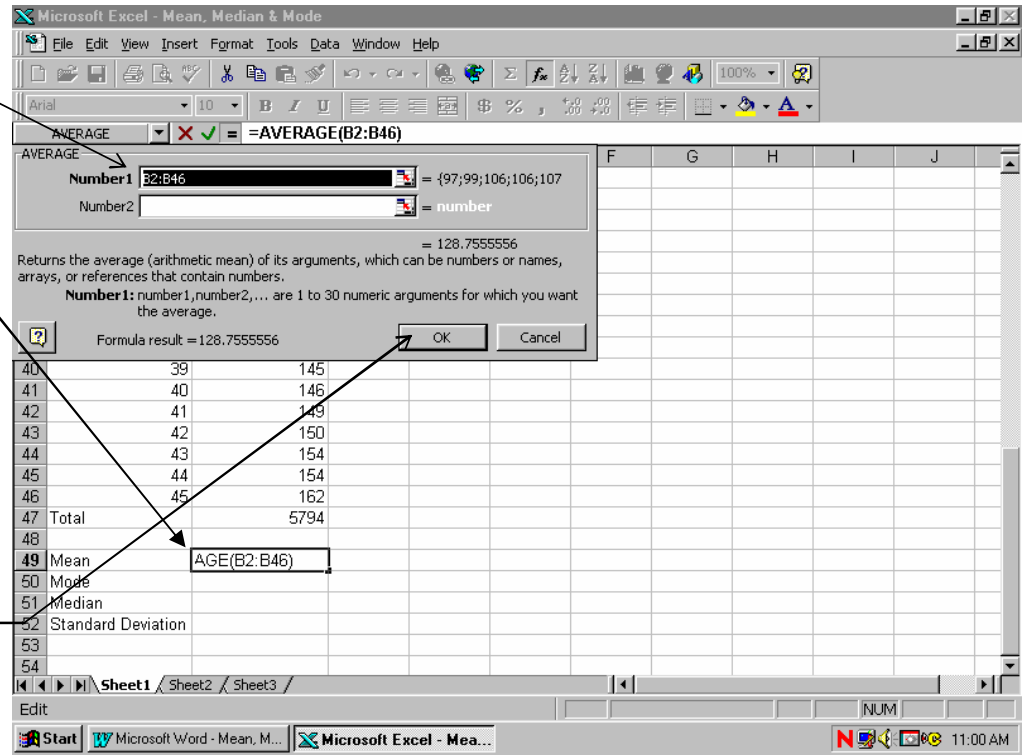
The Paste Function dialog box is open, showing the 'Statistical' category selected in the left pane and 'AVERAGE' selected in the right pane. The function name is 'AVERAGE(number1,number2,...)'. The dialog box also contains the text: 'Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.'

Callouts from text boxes on the left point to the following elements in the screenshot:

- Paste function**: Points to the Paste Function button on the Excel toolbar.
- Select Statistical and Average**: Points to the 'Statistical' category in the left pane and the 'AVERAGE' function in the right pane of the dialog box.
- Select Active Cell B49**: Points to cell B49 in the spreadsheet.
- Click OK**: Points to the OK button in the dialog box.

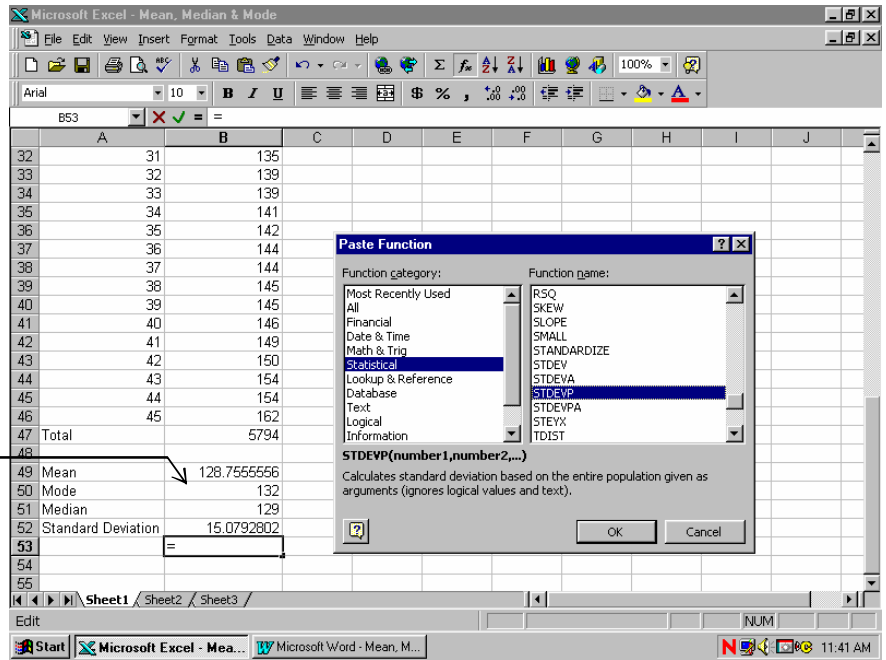
Make sure that all data is included
B2:B46

Click
OK



Check to see if your answers for the Mean, Median, and Mode are the same as you calculated earlier from the sorted data. Also check your answers with the picture below.

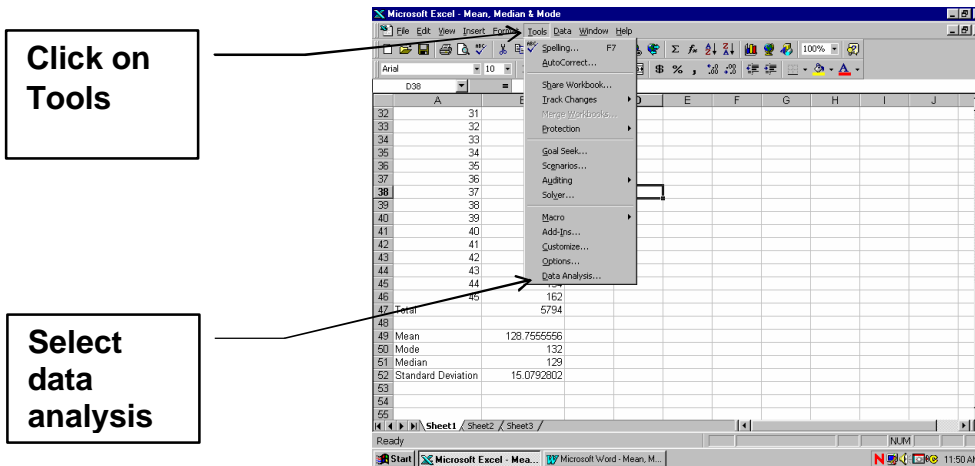
Check
Answers



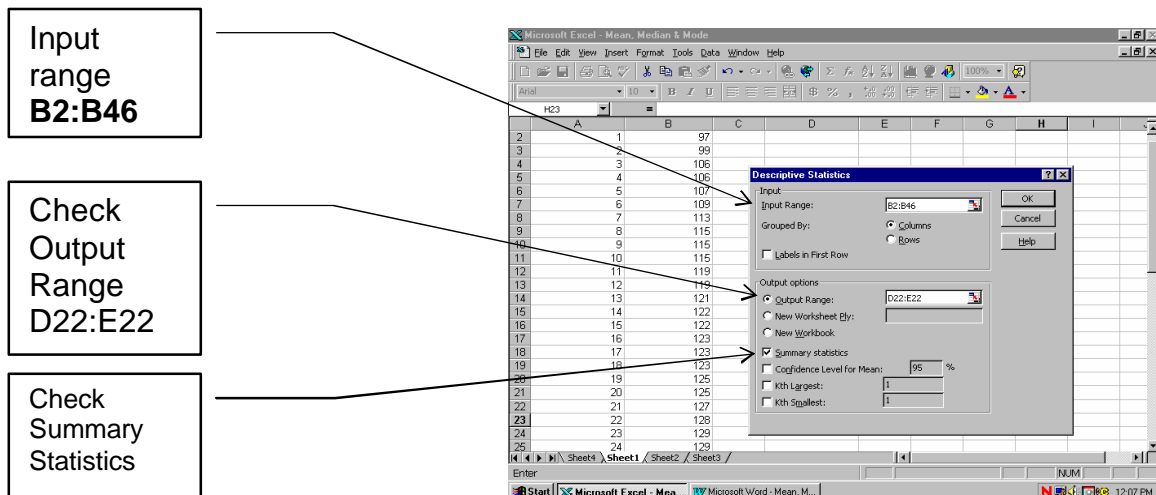
Summary of Descriptive Statistics

Excel will also give you a complete summary of all the descriptive statistics for a set of data. To obtain the summary you **Select Tools** on the toolbar and **Data Analysis** from the pulldown menu.

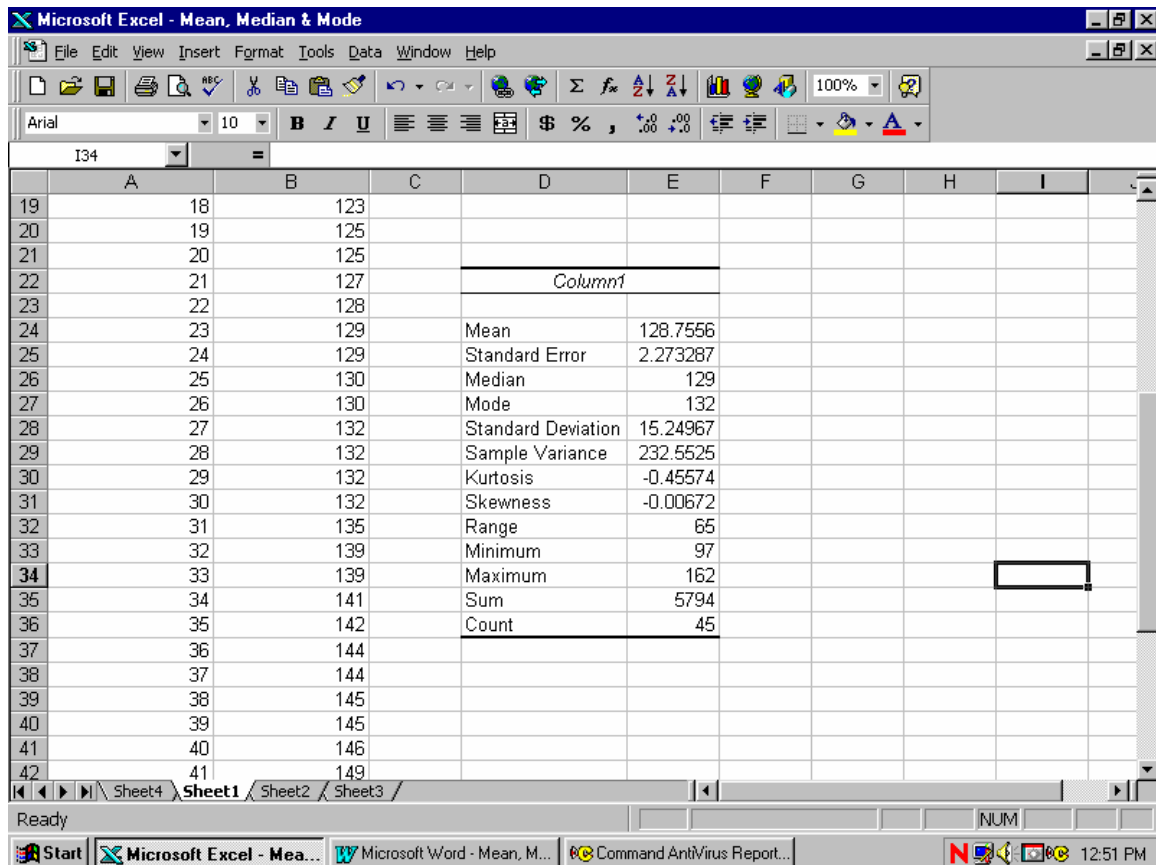
1. **Click on Tools** and select **Data analysis**.
2. Another window will open. **Select Descriptive Statistics**. Click on **OK**.
3. A window will open in which you may select the **Input Range (B2:B46)** and **Output Options**. Under Output options **Click on the Output Range** and select any empty cells in which you wish to print your summary (**D22:E22**). **Also Click on Summary Statistics**. Click **OK**.



A window will open in which you can enter **Input Range** and **Output Options**.



A Summary of all the descriptive statistics should appear. **Double Click** between columns D and E to format column width if needed.



Note: The Standard Deviation obtained in this summary is slightly higher than what we obtained earlier because this is an estimate of what the standard deviation would be based on this as a sample.

Hand in Assignment:

1. On your Excel Worksheet , **Click on** Sheet 2 Tab at the bottom of the worksheet. You will go to a new worksheet.
2. Enter the following marks received by students in a college Math test.
57. 67, 89, 45, 88, 67, 75. 52, 99, 67, 73, 84, 22, 79, 80, 66, 74,
3. Use the **Paste Function** to find the **Mean, Median, Mode, and Standard Deviation** of the class marks.

4. Use the **Data Analysis Tool** to obtain a complete summary of the descriptive statistics for the class marks.
5. **Save and Print** your worksheet and **hand it in**. (If you have trouble saving or printing see Lab 1.)