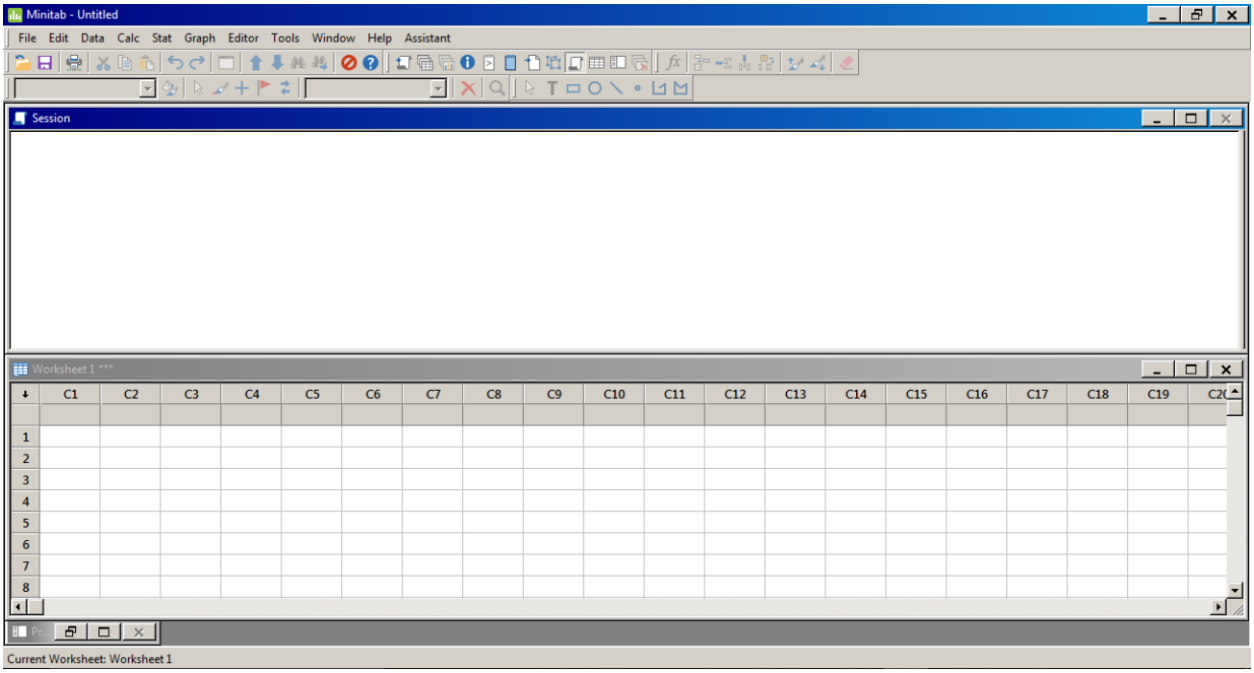
Hannah Spoolstra-MTH 199

Introduction

Minitab is a program that allows one to perform statistical operations and make graphs. Minitab is similar to Excel in that data is entered into a spreadsheet however, it is a program that is meant for statistics and can perform many statistical operations. It provides a simple, effective way to input the statistical data, manipulate that data, identify trends and patterns, and then extrapolate answers to the current issues. This is most widely used software for business of all sizes - small, medium and large.

Getting Started

To use Minitab through the Citrix Server, open the Elmhurst College Portal at https://my.elmhurst.edu. Click on the Citrix Icon . Click on the Citrix XenApp Button*. If a pop-up Install window appears, click on Skip to Log on. Enter your username (enumber) and password to login. Select the Mathematics folder and click on Minitab 18. If a download called launch(18).ica appears, click on it to open Minitab. If a pop-up window appears, click on Permit Use. You should see a start page similar to the one below:



Minitab has a blank session sheet to show all the statistical operations that the user performs. Below is the blank spreadsheet. Columns are labeled as C1, C2, etc. Rows are labeled as 1,2,3,…an so on.

- To type in the cells just click on the cell you want to input a value in and the cell will become highlighted. You can then enter the data into the cell.

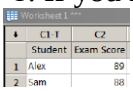
- To move to the cell below you can hit enter or hit the down arrow button. There is an arrow to the left of C1 and above the row 1. If you click on the arrow, it can change the direction in which the data is entered. For example, when the button points down it means that when you hit enter, the cell below the cell you were at will be highlighted in input data. If the arrow points to the right, when you input data into a cell and hit enter, the cell to the right of the cell will be highlighted and data can be inputted into the cell.

Data Entry

Student	Exam Score
Alex	89
Sam	88
Robert	89
Sadie	56
Joe	67
Lily	77
Sarah	87
Beth	84
Scott	73
Ryan	69
Emily	100
Anna	95
Susan	85
Victor	96
Jason	88
Olivia	92
Finn	87
Jim	99
Chris	75
Tina	66

We want to input the data for students' exam scores into Minitab:

- In the gray cell right below C1 and to the left of row 1, enter the title of the first column which will be Student. Then using either the direction arrow or using the right arrow on the keyboard, move over to the gray cell below C2. Enter the title of column 2 which is Exam Score.

- In the C1 column underneath the title, type and enter the first name "Alex" into row 1. If you notice there is a letter T next to the label C1. As shown: 

This means that column 1 is a text column. The data in column 1 will only contain words or letters. Hit enter or the down arrow on the keyboard and enter the rest of the names into each of the cells.

- In C2 enter the number 89 into row 1. Hit enter or the down arrow and continue to fill out the rest of the exam score data that corresponds to the student.

Creating Dot Plots with Minitab

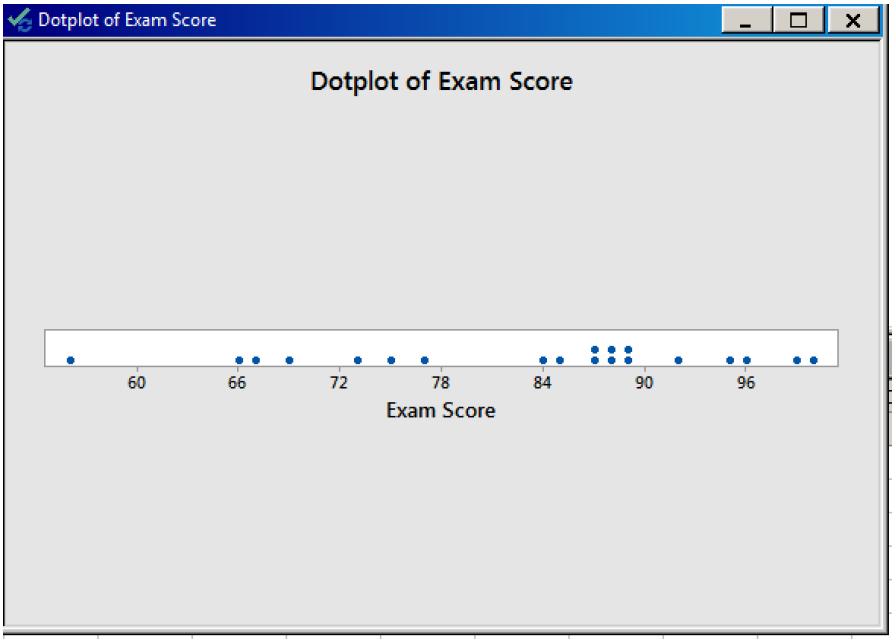
Definition: Dotplots or dot diagrams represent each observation by a dot on a single numerical axis.

The dotplot:

- Is used for smaller data sets, such as $n < 50$.
- Displays the basic shape, center, and spread of data.
- Can highlight points that are unusual observations or outliers.
- Is easy to construct and read.

To make a dotplot with the chart in Minitab:

- Click on graph in the menu bar at the top of the page.
- Select Dotplot….
- When a menu pops up, select simple and click okay.
- Another menu window should pop up. In the box to the right hand side you should see C2 Exam Score. Double click on the option. You should see that the C2 Exam Score appears in the box "Graph Variables" hit okay.
- A dot plot graph should appear:



The session box now displays "dot plot of Exam Score" if you put your cursor over the text a drop down menu appears. This menu can be used to export the dotplot to a word, powerpoint etc. document.

- The dotplot is already labeled but you can change the title and axis titles by double clicking on the graph and axis titles.
- Click on the minus sign to minimize the dotplot.

Histograms on Minitab

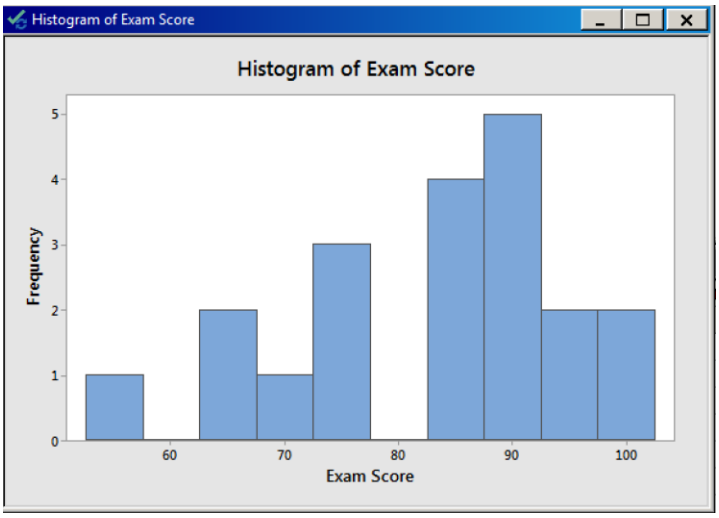
Definition: A histogram is a graphical way to display the frequency of data points within a particular data set.

The histogram:

- Is typically used for larger data sets, such as n > 50. It is not a good graph if you only have a few data points.
- Displays the basic shape, center, and spread of data.
- Condenses large data sets into manageable and readable graphs.
- Is easy to construct and read once the histogram binning method is determined and clearly defined.

To graph the histogram on Minitab:

- Click on graph in the menu at the top of the screen.
- Select Histogram
- Select Simple and when the next box appears double click on C2 Exam hit okay. Histogram should look like:



- Minimize the graph

Change the histogram bins to cut points (boundary values), instead of midpoints. In the histogram, Minitab has a midpoint labelled in each bin. Using cut points may be preferred since the bin locations are not printed directly on the graph when using midpoints.

Minitab

1. Double-click the histogram bins.

2. Click the Binning tab.

3. Under Interval Type, choose Cutpoint.

4. Click OK.

Add a footnote that the histogram bins contain their left endpoints. A footnote is helpful in making notes about your output for easy interpretation.

Minitab

1. Right-click anywhere inside the graph.

2. Choose Add > Footnote.

3. Enter footnote text, such as “Bins contain their left endpoints.”

4. Click OK.

Descriptive Statistics with Minitab

Minitab can find the basic statistical measures of data such as mean, median, range, mode, and more. The calculations can be found in the Calc option at the top of the screen.

- Click on C2 so that the column 2 is highlighted.
- Click on column statistics.
- A menu appears and gives you options to calculate the statistics for the exam score
- Click on the mean and the hit okay.
- The mean should now appear in the session tab.
- Repeat the process to find the median, mode, and range.

Another way to do this and to display more statistics at once:

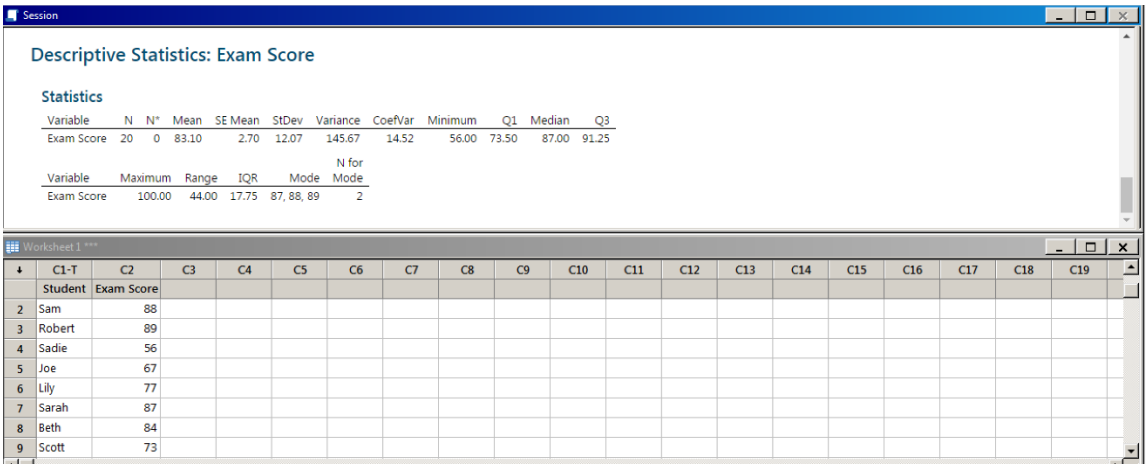
1. Choose Stat > Basic Statistics > Display Descriptive Statistics.

2. In Variables, enter C2 Exam Score

3. Click Statistics and check Mean, Standard deviation, Variance, Median, Mode, Minimum, Maximum, Range, and N total.

4. Click OK in each dialog box

More information is now displayed at once:



Making A Boxplot on Minitab

Minitab

1. Choose Graph > Boxplot.

2. Under One Y, choose Simple, then click OK.

3. Under Graph variables, enter or click on to the right 'Exam Scores.'

4. Click OK.

To obtain the outlier's value, hover the cursor over the outlier and Minitab will display its value. To obtain additional information about the boxplot, such as quartile values, hover over the boxplot itself. Minitab will display a tooltip containing the boxplot's quartiles, IQR, whisker endpoints, and sample size.

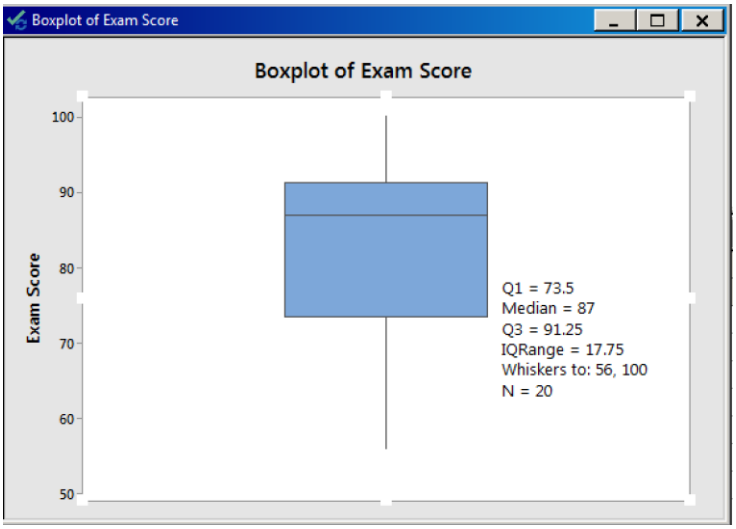
In Minitab, you can copy the tooltip information onto the plot using these steps:

1. Hover over the boxplot to display the tooltip (see boxplot on left).

2. Right-click on the boxplot > Copy Text (see boxplot on the right).

Press Ctrl+V to paste the tooltip information onto the boxplot.

4. (Optional) Click and drag the textbox to move it within the plot to the desired location.



Comparing Two Samples

Minitab can tell a user if there is a correlation between two samples. Minitab can also be used to compare two samples and perform other operations Add another in your Minitab document so that your spreadsheet has this information:

Student	Exam Score	Final Exam Score
Alex	89	85
Sam	88	95
Robert	89	80
Sadie	56	60
Joe	67	65
Lily	77	79
Sarah	87	75
Beth	84	88
Scott	73	65
Ryan	69	73
Emily	100	95
Anna	95	93
Susan	85	90
Victor	96	85
Jason	88	78
Olivia	92	83
Finn	87	91
Jim	99	92
Chris	75	80
Tina	66	70

The Pearson correlation coefficient is used to measure the strength of a linear association between two variables, where the value $r = 1$ means a perfect positive correlation and the value $r = -1$ means a perfect negative correlation. So, for example, you could use this test to find out whether people's height and weight are correlated (they will be - the taller people are, the heavier they're likely to be).

To find the correlation coefficient:

1. Stat>Basic Statistics< Correlation
2. Click on C2 and C3 in the box to the right and click okay
3. The correlation should appear in the session box.

Is there a strong positive/negative correlation? _____

To Save on Minitab

- Go to file> Save Project as…
- Go to Computer>Local Disk C< Scroll down to user
- Your name should be on one of the folders, click on your name. Then click on my documents to save the document to your computer.

Exercises

Exercise 1

The following table shows the film lengths (in minutes) of a sample of videotape versions of n = 22 films directed by Alfred Hitchcock. Films are listed in alphabetical order. The data are in the Minitab columns "Hitchcock Movies" and "Film Lengths (min)."

Film	Lengths (min)	Film	Lengths (min)
The **B**irds	119	**P**sycho	108
Dial M for Murder	105	**R**ear Window	113
Family Plot	120	**R**ebecca	132
Foreign Correspondent	120	**R**ope	81
Frenzy	116	**S**hadow of a Doubt	108
I Confess	108	**S**pellbound	111
The **M**an Who Knew Too Much	120	**S**trangers on a Train	101
Marnie	130	**T**o Catch a Thief	103
North by Northwest	136	**T**opaz	126
Notorious	103	**U**nder Capricorn	117
The **P**aradise Cane	116	**V**ertigo	128

(a) Construct a histogram of this data in Minitab.

(b.) Include a more descriptive title with the histogram, such as "Histogram of a Sample of Hitchcock Film Lengths (min)."

2). Find the descriptive statistics for each brand.

Ten batteries from brands A, B, and C were tested to determine their lifetimes (in hours).

Brand A:	41	289	214	102	38	94	179	87	116	155
Brand B:	39	65	22	64	22	191	99	32	142	317
Brand C:	24	95	139	122	41	360	318	34	43	18

3). The local ice cream shop keeps track of how much ice cream they sell versus the temperature on that day, here are their figures for the last 12 days:

Ice Cream Sales vs Temperature	
Temperature °C	**Ice Cream Sales**
14.2°	$215
16.4°	$325
11.9°	$185
15.2°	$332
18.5°	$406
22.1°	$522
19.4°	$412
25.1°	$614
23.4°	$544
18.1°	$421
22.6°	$445
17.2°	$408

Find if there is a correlation between the temperature and the ice cream sales.