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LESSON 5 - MEASURES OF CENTRAL TENDENCY

In this lesson we will see how to use Minitab to find two of the three measures of central tendency that were discussed in class, the mean and the median. Retrieve the worksheet DJSS5.MTW that you created and saved in Lesson 1. Clear everything below the date/time stamp, type your name, Lesson 5, and Examples on separate lines below the date/time stamp. Now click **Stat > Basic Statistics > Display Descriptive Statistics**. Select C1 DJC into the "Variables:" box then click on "Statistics". Click on the various check boxes as needed so that only "Mean" and "Median" are checked. Then click "OK" and "OK". The mean and median for DJC should now be displayed in the session window as shown in the box to the right.

Descriptive Statistics: DJC

| Variable | Mean | Median |
|----------|--------|--------|
| DJC | 9706.6 | 9909.0 |

Now let us find the mean and median for each of our samples. Click **Stat > Basic Statistics > Display Descriptive Statistics** again, but this time highlight C2 through C6 and click "Select". Click on "Statistics" and check the box "N total" (to also display the sample size) then "OK" and "OK". The sample size, mean and median for all five samples will be displayed in the session window. If we think of DJC as the population, how do the means and medians of the samples compare with the those of the population?

Now let us explore the advantage of choosing larger samples. In the data window highlight the area that contains the samples of size 5 by dragging across them with the left mouse button depressed, then click **Edit > Clear Cells**. Now use the procedure from Lesson 1 to create samples with replacement of size 30 into columns C2 - C6. Save this worksheet as DJSS30 as you will need it again in Lesson 10. Finally, find the mean and median of these samples of size 30. If we compare these sample means to the population mean, we can see that they generally are much closer to the population mean than the means of the samples of size five.

SEPARATING STATISTICS BY VARIABLES

Just as we separated dotplots by variables in Lesson 4, we separate statistics by variables. Close the data window and retrieve the worksheet K:\Minitab16\Sample Data\Bears.MTW. Use the procedure given above to find the mean length of the bears. Now click **Stat > Basic Statistics > Display Descriptive Statistics** again, but this time click in the box "By variables (optional):" and select C4 Sex into that box. Now click "OK". The results are shown in the figure to the right. We see that the bears of Sex 1 seem to be longer on


Results for: Bears.MTW

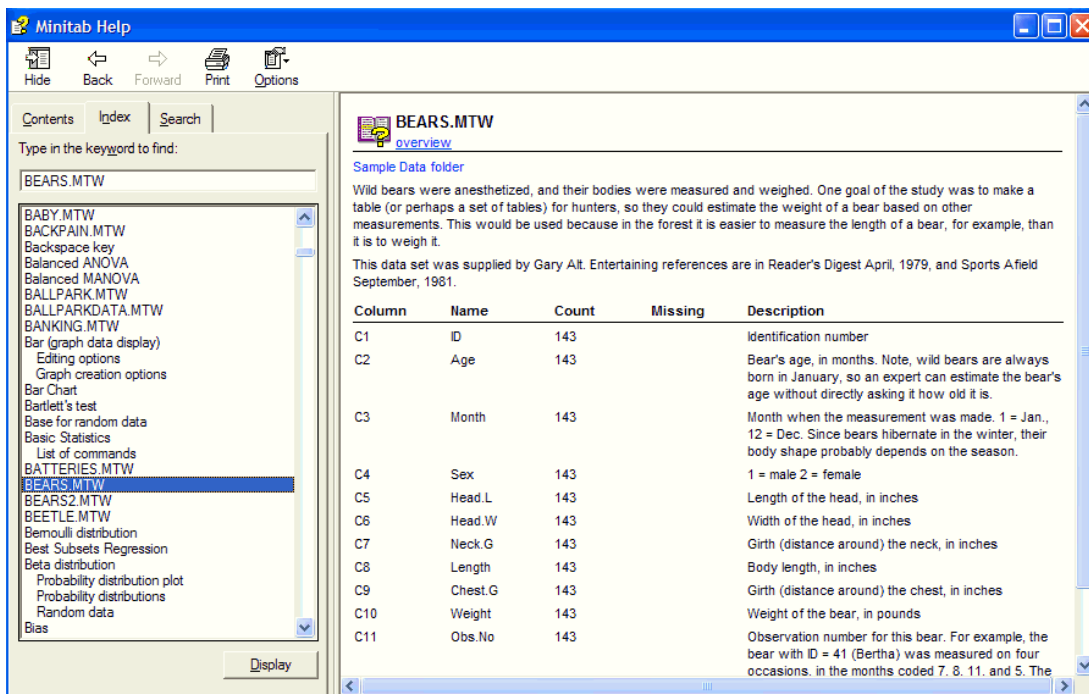
Descriptive Statistics: Length

| | Total | | |
|----------|-------|--------|--------|
| Variable | Count | Mean | Median |
| Length | 143 | 61.283 | 61.000 |

Descriptive Statistics: Length

| | | Total | | |
|----------|-----|-------|--------|--------|
| Variable | Sex | Count | Mean | Median |
| Length | 1 | 99 | 62.88 | 64.00 |
| | 2 | 44 | 57.693 | 58.750 |

the average than those of Sex 2. Since males of most mammals are larger than females, we might guess that Sex 1 = Male and Sex 2 = Female. To verify this, click the help icon , click the "Index" tab and type "sample" into the keyword box. Now click on "Sample data sets" and on the "Display" button at the bottom of the page. Click on the "B" button at the top of the right portion of the page, then click on "BEARS". Then we will see the following window below. We see from the description of the file that our guess about the variable Sex was correct. We also note that the variable Month is the month that the measurements were made. Close the help window.



Would we expect the Month that the measurements were made to effect the length of the bears? Of course not! Find the mean length of the bears separated by month. The results are in the figure to the right. There is certainly variation in the sample means, but not in any clear pattern.

Would we expect the mean length to be affected by the age of the bears? We would guess yes, for young bears, but once they become adults, the age should not matter. Find the length of bears by age. Do the results support our guess?

| Variable | Month | Total Count | Mean | Median |
|----------|-------|-------------|-------|--------|
| Length | 4 | 13 | 62.23 | 62.00 |
| | 5 | 9 | 55.78 | 57.00 |
| | 6 | 7 | 57.59 | 58.50 |
| | 7 | 16 | 61.53 | 63.00 |
| | 8 | 34 | 62.04 | 61.25 |
| | 9 | 31 | 61.16 | 61.00 |
| | 10 | 19 | 63.24 | 64.00 |
| | 11 | 14 | 61.27 | 62.50 |

MINITAB ASSIGNMENT 5

See instructions on page 8.

1. Retrieve the worksheet EISS8.MTW that you created and saved in Minitab Assignment 1.
 - (a) Display the count, mean and median for e-mails received.
 - (b) Display the count, mean and median for the five samples.
 - (c) Delete the samples of size 8 and replace them with samples of size 40. Be sure you sample with replacement. Save this worksheet as EISS40.MTW. You will need it again in Lesson 10.
 - (d) Display the count, mean and median for these new samples of size 40.
 - (e) Is there a significant difference in the accuracy of the sample means and medians based on samples of size 8 and samples of size 40? Justify your answer. Type your answer to this part in the session window.
2. Retrieve the worksheet K:\Minitab16\Sample Data\Bears.MTW. Find the count, mean and median of the weight of all the bears together, and of the bears by sex. Do the results seem reasonable based on what we know about the sex of the bears? Explain. Type your answer in the session window.

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