

Chapter**8**

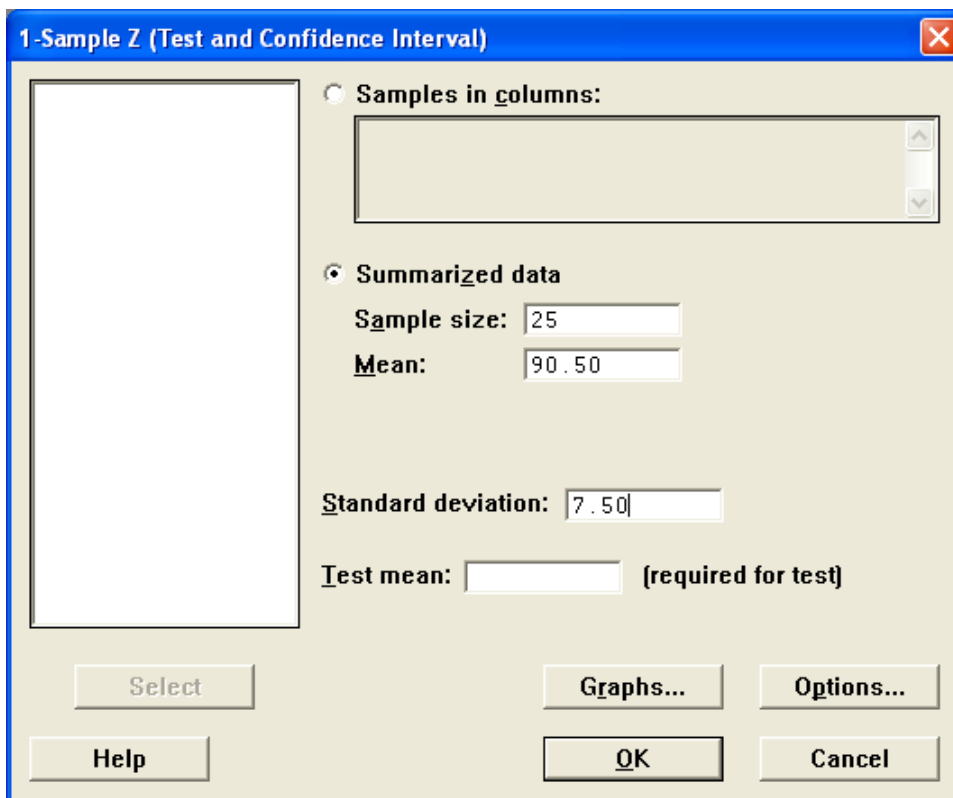
Estimation of the Mean and Proportion

Section 8.3

Example 8-1, pg.343 A Confidence Interval for μ : σ Known

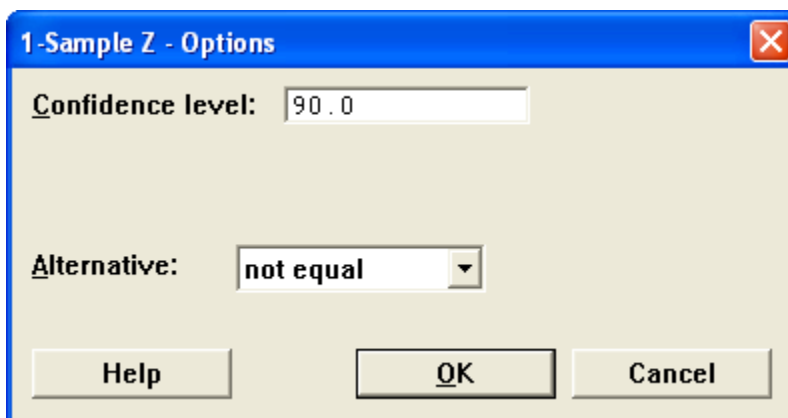
Before publishing a new textbook, the publishing company wants to know the average price of all similar textbooks on the market. The research department took a sample of 25 comparable textbooks and found a mean price of \$90.50. It is known that the standard deviation of the prices of all such textbooks is \$7.50.

To construct a 90% confidence interval for the mean of all such textbooks, click on **Stat** → **Basic Statistics** → **1-Sample Z**. Click on **Summarized Data** and enter the sample size and sample mean. For **Standard deviation**, enter the assumed value of 7.50.



The dialog box is titled "1-Sample Z (Test and Confidence Interval)". It features a large empty rectangular box on the left. On the right, there are two radio buttons: "Samples in columns:" (unselected) and "Summarized data" (selected). Below the "Summarized data" radio button, there are three input fields: "Sample size:" with the value "25", "Mean:" with the value "90.50", and "Standard deviation:" with the value "7.50". Below these, there is a "Test mean:" input field which is empty, followed by the text "(required for test)". At the bottom, there are five buttons: "Select", "Help", "Graphs...", "Options...", "OK", and "Cancel".

Next, select **Options** and enter **90.0** for the **Confidence Level**. This screen is used for both confidence intervals and hypothesis tests. In this example, you are calculating a confidence interval; however, you must set the **Alternative** option to **not equal** in order to calculate the confidence interval.



The dialog box is titled "1-Sample Z - Options". It has a "Confidence level:" input field with the value "90.0". Below this, there is an "Alternative:" label followed by a dropdown menu showing "not equal". At the bottom, there are three buttons: "Help", "OK", and "Cancel".

Click on **OK** and the interval will be displayed in the Session Window.

One-Sample Z

The assumed standard deviation = 7.5

N	Mean	SE Mean	90% CI
25	90.5000	1.5000	(88.0327, 92.9673)

Based on a 90% confidence interval, the average price of all similar textbooks is (\$88.03, \$92.97).

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Problem 8.17, pg. 349

Enter the 35 data points into C1.

42	51	42	31	28	36	49
29	46	37	32	27	33	41
47	41	28	46	34	39	48
26	35	37	38	46	48	39
29	31	44	41	37	38	46

To construct a 98% confidence interval for the mean, click on **Stat → Basic Statistics → 1-Sample Z**. Click on **Samples in Columns** and enter C1, the column containing the data. For **Standard deviation**, enter the assumed value of 2.65. Next, select **Options** and enter 98.0 for the **Confidence Level**. This screen is used for both confidence intervals and hypothesis tests. In this example, you are calculating a confidence interval; however, you must set the **Alternative** option to **not equal** in order to calculate the confidence interval. Click on **OK** and the interval will be displayed in the Session Window.

One-Sample Z: C1

The assumed sigma = 2.65

Variable	N	Mean	StDev	SE Mean	98.0% CI
C1	35	38.343	7.149	0.448	(37.301, 39.385)

So, the confidence interval is (37.301, 39.385). Notice that the mean is 38.343.

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Section 8.4

Example 8-6, pg. 355 A Confidence Interval for μ : σ Unknown

Sixty-four randomly selected adults who buy books for general reading were asked how much they usually spend on books per year. The sample produced a mean of \$1450 and a standard deviation of \$300. Determine a 99% confidence interval for the population mean.

To construct a 99% confidence interval for the mean amount spent on books per year, click on **Stat** → **Basic Statistics** → **1-Sample T**. Click on **Summarized Data** and enter the sample size, sample mean and sample standard deviation. Next, select **Options** and enter 99.0 for the **Confidence Level**. This screen is used for both confidence intervals and hypothesis tests. In this example, you are calculating a confidence interval; however, you must set the **Alternative** option to **not equal** in order to calculate the confidence interval.

Click on **OK** and the interval will be displayed in the Session Window.

One-Sample T

Test of $\mu = 65$ vs not = 65

N	Mean	StDev	SEMean	99% CI	T	P
64	1450	300	37.50	(1350.39, 1549.61)	36.93	0.00

Based on a 99% confidence interval, the mean annual expenditure on books for general reading is (\$1350.39, \$1549.61).

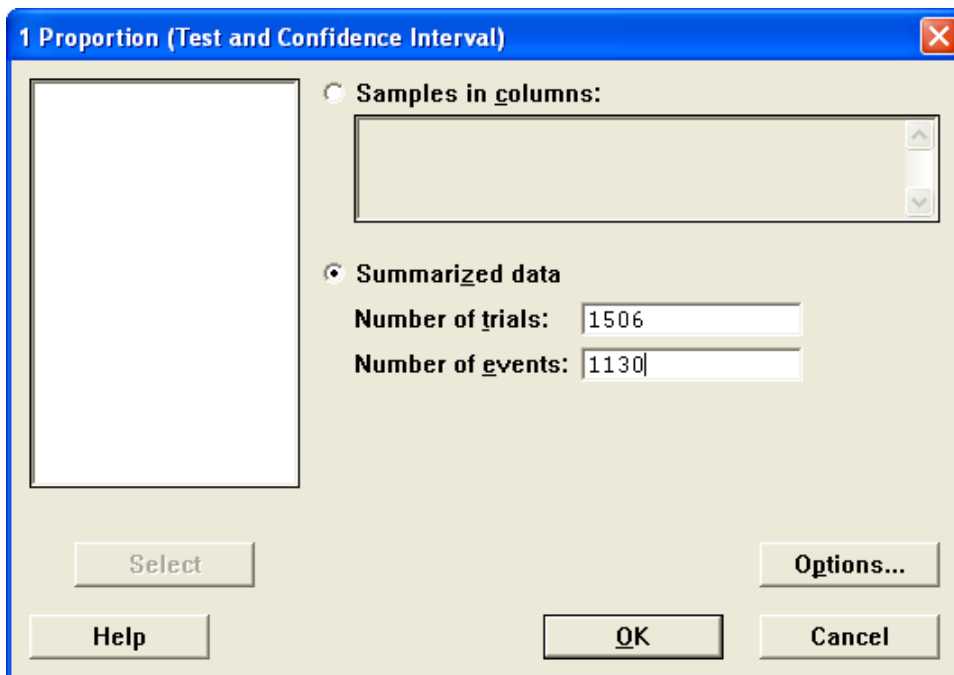
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Section 8.5

Example 8-7, pg. 361 A Confidence Interval for p

According to this poll, 75% of a sample of 1506 Americans indicated that they frequently have symptoms of sleep problems. To construct a 99% confidence interval for p , the percentage of all Americans who frequently have symptoms of sleep problems, first verify that the assumptions of this method are satisfied by confirming that $\hat{n}\hat{p}$ and $\hat{n}\hat{q}$ are both greater than 5.

Next, click on **Stat** → **Basic Statistics** → **1 Proportion**. Select **Summarized Data**. The **Number of trials** is 1506 and the **Number of events** is $.75 * 1506 = 1129.5$ (round this number up to 1130).



Next, to select the confidence level, click on **Options**. Enter 99.0 for the **Confidence Level**. This screen is used for both confidence intervals and hypothesis tests. In this example, you are calculating a confidence interval; however, you must set the **Alternative** option to **not equal** in order to calculate the confidence interval. Since you verified that the requirements for this test have been met, click on **Use test and interval based on normal distribution**.

Click on **OK** twice and the output will be displayed in the Session Window.

Test and CI for One Proportion**Test of $p = 0.5$ vs $p \text{ not } = 0.5$**

Sample	X	N	Sample p	99% CI	Z-Value
1	1130	1506	0.750332	(0.7216, 0.7791)	19.43

P-Value**0.000**

Notice the interval is (.722, .779). With 99% confidence, the percentage of all Americans who frequently have symptoms of sleep problems is between 72.2% and 77.9%.

Suggested Exercises

Section 8.3

pp. 349 - 350: 8.18, 8.24

Section 8.4

pp. 358 - 359: 8.60, 8.64

Section 8.5

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Mini-Projects

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Technology Assignments

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