



## hp calculators

HP 49G+ Confidence Intervals – Real Estate

The STAT menu

Confidence Intervals

Practice finding confidence intervals – Real Estate



## The STAT menu

The Statistics menu is accessed from the RED shifted function of the  $\boxed{5}$  key by pressing  $\boxed{\rightarrow}$   $\boxed{STAT}$ . When pressed, a CHOOSE box is displayed with a number of problem areas within statistics where the HP 49G+ can be applied.



Figure 1

The first choice deals with calculating many values related to the statistics of a single variable, such as the average, standard deviation and others. The second choice deals with placing data within bins or classes and is useful when dealing with frequency distributions or when there is a need to summarize data within a histogram. The third choice, Fit Data.. is used to compute trend lines. The fourth choice allows for the computation of summary statistics from a data set, such as the sum of all X values, the sum of all the Y values squared, and others. The fifth choice allows for the evaluation of many different hypothesis tests and the sixth choice allows for the construction of confidence intervals around a sample mean.

To determine a confidence interval, press  $\boxed{6}$   $\boxed{ENTER}$  to immediately choose the Conf. interval function.

## Confidence Intervals

The next screen displays the choices for the different types of confidence intervals the HP 49G+ can evaluate.

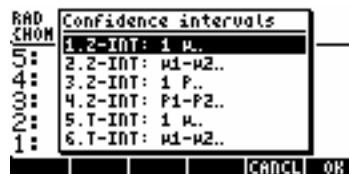


Figure 2

The first choice is for a sample confidence interval for the population mean with either a known population variance or for a large sample (usually more than 30) with an unknown population variance. It uses the sample mean as the midpoint of the interval. It is frequently used to estimate the average of the entire population from the mean of a sample.

The second choice is for a sample confidence interval for the difference between two population means with either a known population variance or for a large sample (usually over 30) if the population variance is unknown. The resulting interval is the range within which there is the specified confidence level that the difference in the population means would fall. If zero is not included in this interval, the population means are not considered equal, at the given level of confidence. If zero is included, then it is not possible to deny that the actual population averages are equal.

The third and fourth choices are similar to the first two choices, except that they are applied to proportions.

The first four choices use the normal probability distribution.

The fifth and sixth choices are similar to the first two choices, except they deal specifically with situations where small sample sizes are present and the population variances and standard deviations are unknown. These use the Student's t probability distribution.

When chosen, each confidence interval displays an input form where the necessary information to construct the confidence interval is entered, including the sample averages, population or sample standard deviations, size of the sample(s), and the level of confidence desired for the interval. The level of confidence relates to the desired level of assurance that the population mean (or other parameter) would fall into the range of the confidence interval. There is a potential trap here, since to be 100% confident that the population mean is within the interval range, the interval would have to be infinite in size. Otherwise, there would always be a small chance the population parameter would be outside the range. That is why we often see confidence intervals of 90%, 95%, etc.

The resulting interval can be displayed either in a text/formula view or in a graphical view.

### Practice finding confidence intervals – Real Estate

**Example 1:** A sample of 100 sales prices of homes within a zip code was taken. The sample average sales price was \$205,000 with a standard deviation of \$15,410. Construct a 95% confidence interval for the population mean for the average sales price of all homes within the zip code.

**Solution:** Since the sample size is over 30, we can use the first confidence interval even though the population variance and population standard deviation are not known.

$\rightarrow$  STAT 6 ENTER ENTER 2 0 5 0 0 0 ENTER 2 8 0 0 0 ENTER  
 1 0 0 ENTER 0 . 9 5 ENTER

```

CONF. INT.: 1  $\mu$ , KNOWN  $\sigma$ 
 $\bar{x}$ : 205,000.00
 $\sigma$ : 8,000.00
n: 100.00
c: 0.95
Sample Mean
EDIT HELP CANCL OK
  
```

Figure 3

OK

```

95.00% Confidence interval
Critical Z=±1.96
 $\mu$  Min = 203,432.00
 $\mu$  Max = 206,568.00
  
```

Figure 4

HELP GRAPH CANCL OK

GRAPH

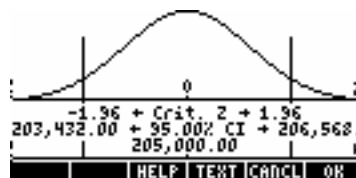


Figure 5

HELP TEXT CANCL OK

OK

```

RAD XYZ HEX R= 'X'
{HOME}
5:
4:
3:
2: Critical Z: (-1.96 1.96)
1: Interval: (203,432.00 206,568.00)
EDIT VIEW STACK RCL PURGE CLEAR
  
```

Figure 6

**Answer:** The 95% confidence interval is the range of \$203,432 and \$206,568. This means there is a 95% confidence that the population mean falls within this range. We can be 95% confident that if all houses in the zip code were sold, the population average would be between these two values.

**Example 2:** Two realtors were being compared by their office manager. A sample of 15 houses sold by Realtor 1 generated an average price of \$186,200 and a sample standard deviation of \$25,480. A sample of 12 houses sold by Realtor 2 generated an average price of \$193,200 and a sample standard deviation of \$34,320. At the 95% confidence level, is the average sales amount different between the two realtors significant?

Solution:

This will be a confidence interval for the difference between the two population means, both of which are estimated by the sample means of the two realtors. If this confidence interval, reflecting the difference between the average sales amount generated in a quarter by the two realtors, includes the value of zero, then we cannot rule out the possibility that the average sales amount of two realtors would be the same if we took all their sales into account. In other words, just because Realtor 2's sample average is higher than Realtor 1's, it does not mean that Realtor 2 is the better salesperson, if zero is a value within the confidence interval at this level of confidence.

This will be a confidence interval from choice 6 of the CHOOSE box, because we will be comparing the difference between 2 population means with unknown population variances. It will use the Student's t statistic. Note that since we have the sample's standard deviations rather than the population's standard deviations, the Checkbox for "pooled" will need to be selected. If we had the population's standard deviations, this would not be necessary.

(→) STAT (6) (ENTER) (6) (ENTER) (1) (8) (6) (2) (0) (0) (ENTER) (1) (9) (3) (2) (0) (0) (ENTER)  
 (2) (5) (4) (8) (0) (ENTER) (3) (4) (3) (2) (0) (ENTER) (1) (5) (ENTER) (1) (2) (ENTER)  
 (0) (.) (9) (5) (ENTER) (✓) (CHK)

```

CONF. INT.: 2 μ, UNKNOWN σ
x1: 186200.   x2: 193200.
s1: 25480.   s2: 34320.
n1: 15.      n2: 12.
C: .95       [X] Pooled
Pooled if checked
EDIT [✓] CHK HELP [ ] CANCL [ ] OK
  
```

Figure 7

OK

```

95.2 Confidence interval
Critical T: ±2.059539
μ Min = -30686.87
μ Max = 16686.87
  
```

HELP GRAPH CANCL OK

Figure 8

GRAPH

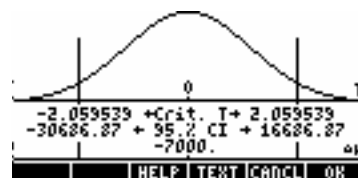


Figure 9

OK

```

RAD XYZ HEX R= 'X'
[HOME]
5:
4:
3:
2: Critical T: (-2.0595)
1: Interval: (-30686.86)
EDIT VIEW STACK RCL PURGE CLEAR
  
```

Figure 10

Answer:

The 95% confidence interval is the range of -\$30,687 and +\$16,687. This means there is a 95% confidence that the difference between the populations mean falls within this range. We can be 95% confident that if all houses by the two realtors were averaged, the difference between these population means would fall between these two values. Since zero is in this range, at the 95% level of confidence, we cannot say that one realtor would do better than the other.