



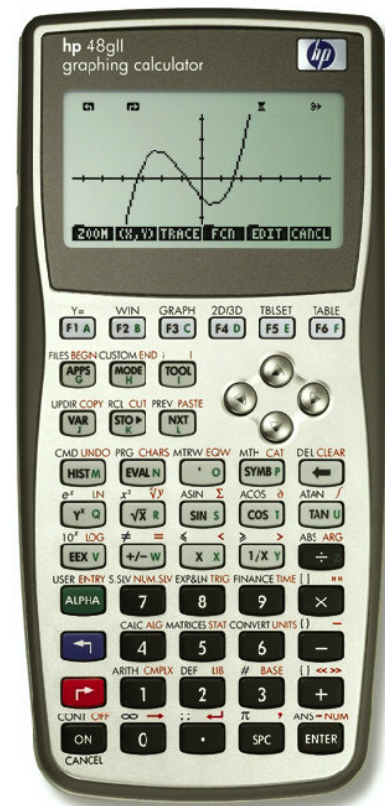
## hp calculators

HP 48GII Hypothesis tests – Real Estate

The STAT menu

Hypothesis tests

Practice evaluating hypothesis tests – Real Estate



## The STAT menu

The Statistics menu is accessed from the RED shifted function of the **(5)** key by pressing **( $\rightarrow$ ) STAT**. When pressed, a CHOOSE box is displayed with a number of problem areas within statistics where the HP 48GII 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 evaluate a hypothesis test, press **(5) (ENTER)** to immediately choose the Hypoth. tests function.

## Hypothesis tests

The next screen displays the choices for the different types of hypothesis tests the HP 48GII can evaluate. A hypothesis test makes a statement about a population statistic, usually the mean, and acceptance of the hypothesis is determined by taking a sample from the population.

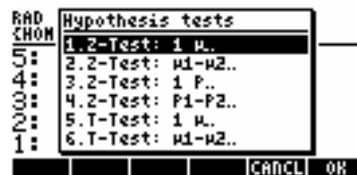


Figure 2

The first choice is for a hypothesis test for the population mean with either a known population variance or for a large sample (usually more than 30) with an unknown population variance.

The second choice is for a hypothesis test 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 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 and calculate a critical Z value.

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 hypothesis test displays an input form where the necessary information to evaluate the hypothesis test is entered, including the proposed population statistic value, sample averages, population or sample standard deviations, size of the sample(s), and the level of significance desired for the evaluation of the hypothesis test.

## Practice evaluating hypothesis tests – Real Estate

**Example 1:** Jack believes that the average price for all homes in his area is \$217,000. A sample of 100 sales prices of homes within his area was taken. The sample average sales price was \$215,000 with a standard deviation of \$24,000. Evaluate the null hypothesis at a 5% significance level. Should Jack's hypothesis be accepted?

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

$\rightarrow$  STAT 5 ENTER ENTER 2 / 7 0 0 0 ENTER 2 4 0 0 0 ENTER  
 2 / 5 0 0 0 ENTER / 0 0 0 ENTER 0 . 0 5 ENTER

```

Z-TEST: 1  $\mu$ , KNOWN  $\sigma$ 
 $\mu_0$ : 217,000.  $\sigma$ : 24,000.
 $\bar{x}$ : 215,000.
n: 100.0000
 $\alpha$ : 0.0500
  
```

Significance level

EDIT HELP CANCEL OK

Figure 3

OK  $\nabla$   $\nabla$  (this is to test whether the average is equal to or not equal to the null value of \$217,000).

```

Z-TEST: 1  $\mu$ , KNOWN  $\sigma$ 
 $\mu_0$ : 217,000.  $\sigma$ : 24,000.
Alternative Hypothesis
 $\bar{x}$ :  $\mu < 217,000.0000$ 
n:  $\mu > 217,000.0000$ 
 $\alpha$ :  $\mu \neq 217,000.0000$ 
  
```

Significance level

CANCEL OK

Figure 4

OK

```

Test Z=-0.8333
Prob=0.4047
Critical Z= $\pm$ 1.9600
Critical  $\bar{x}$ =( 212,300.0000
  
```

HELP GRAPH CANCEL OK

Figure 5

GRAPH

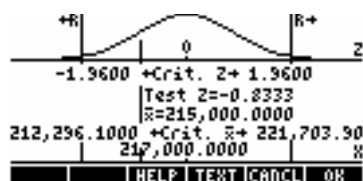


Figure 6

OK

```

RAD XYZ HEX R= 'N'
<HOME>
5:
4: Test Z:(-0.8333333333
3: Prob:0.404656761928
2: Crit Z:(-1.95996398
1: Crit  $\bar{x}$ :(212296.0864
EDIT VIEW RCL STOP PURGE CLEAR
  
```

Figure 7

**Answer:** The critical Z values indicate the boundaries beyond which we would not be able to accept the null hypothesis if the calculated or test Z value is above or below those critical values. The critical Z values for this hypothesis test

are  $-1.96$  and  $1.96$ . The test Z or calculated Z value is  $-0.8333$ , which falls within the critical Z value boundaries. We therefore would fail to reject the null hypothesis. Jack's estimate of the average price of all houses in his area would be accepted.

**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 5% significance level, is the average sales amount different between the two realtors significant? The null hypothesis would be that the difference between the two realtor's average sales prices would be zero.

**Solution:** This will be a hypothesis test for the difference between the two population means, both of which are estimated by the sample means of the two realtors.

This will be a hypothesis test 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 samples' standard deviations rather than the populations' standard deviations, the Checkbox for "pooled" will need to be selected. If we had the populations' standard deviations, this would not be necessary.

$\rightarrow$  STAT 5 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 2 0 ENTER 1 5 ENTER 1 2 ENTER  
 0 . 0 5 ENTER ☒CHK

```

T-TEST: 2 μ, UNKNOWN σ
x1: 186,200. x2: 193,200.
s1: 25,480.0 s2: 3,420.00
n1: 15.0000 n2: 12.0000
α: 0.0500 ☒Pooled?
"Pooled" if checked
EDIT ☒CHK HELP CANCEL OK
  
```

Figure 8

$\text{OK} \downarrow \downarrow$  (this is to test whether the two averages are equal to each other – in other words, is the difference between the averages zero or not).

```

T-TEST: 2 μ, UNKNOWN σ
x1: 186,200. x2: 193,200.
s1: 25,480.0 s2: 3,420.00
n1: 15.0000 n2: 12.0000
α: 0.0500 ☒Pooled?
Alternative Hypothesis
μ1<μ2 .00
μ1>μ2 .00
μ1≠μ2 .00
"Pooled" if checked
CANCEL OK
  
```

Figure 9

$\text{OK}$

```

Accept μ1=μ2 at 5.0000% LVL
Test T=-0.9413
Prob=0.3556
Critical T=±2.0595
  
```

HELP GRAPH CANCEL OK

Figure 10

GRAPH

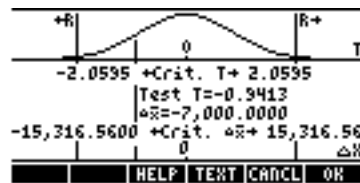


Figure 11

OK

```

RAD XYZ HEX R= 'X'
{HOME}
5:
4:
3: Test T:(-.941253812)
2: Prob:.355581799142
1: Crit T:(-2.05953855)
EDIT VIEW RCL STO PURGE CLEAR

```

Figure 12

Answer:

The critical Z values indicate the boundaries beyond which we would not be able to accept the null hypothesis if the calculated or test Z value is above or below those critical values. The critical Z values for this hypothesis test are -2.06 and 2.06. The test Z or calculated Z value is -0.9413, which falls within the critical Z value boundaries. We therefore would fail to reject the null hypothesis. There is no reason to believe there is any difference between the two realtors.