

How can I use the Central Limit Theorem on my TI-84 calculator?

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The Central Limit Theorem is a statistical concept that allows us to make inferences about a population based on a sample. It states that the mean of a large sample will approximate the mean of the population, regardless of the distribution of the data. This theorem can be applied using a TI-84 calculator by using the "1-PropZInt" or "2-SampZInt" functions for proportion and mean calculations, respectively. These functions use the sample mean and standard deviation to calculate confidence intervals and test hypotheses about the population mean. By utilizing the Central Limit Theorem on a TI-84 calculator, users can easily and accurately make statistical inferences about a population from a sample.

Apply the Central Limit Theorem on TI-84 Calculator

The states that the sampling distribution of a sample mean is approximately normal if the sample size is large enough, even if the population distribution is not normal.

The central limit theorem also states that the sampling distribution will have the following properties:

1. The mean of the sampling distribution will be equal to the mean of the population distribution:

$$\bar{x} = \mu$$

2. The standard deviation of the sampling distribution will be equal to the standard deviation of the population divided by the sample size:

$$s = \sigma / \sqrt{n}$$

To find probabilities related to the sample mean on a TI-84 calculator, we can use the `normalcdf()` function with the following syntax:

`normalcdf(lower value, upper value, x,  $s/\sqrt{n}$ )`

where:

x: sample mean

s: sample standard deviation

n: sample size

To access this function on a TI-84 calculator, simply press **2nd** then press **VARS** then scroll down to `normalcdf()` and press **ENTER**.



The following examples show how to use this function

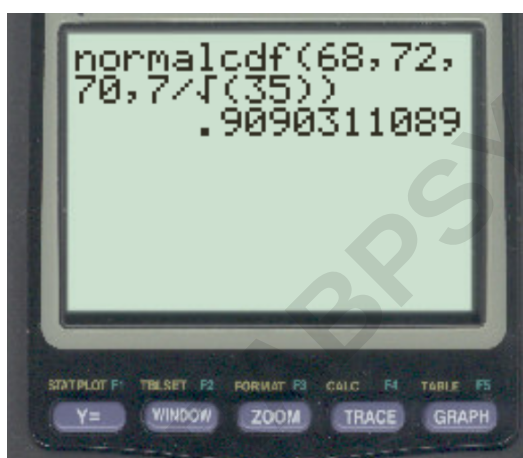
in practice.

Example 1: Find Probability Between Two Values

A distribution has a mean of 70 and a standard deviation of 7. If we select a random sample of size $n = 35$, find the probability that the sample mean is between 68 and 72.

We can use the following syntax on the TI-84:

`normalcdf(68, 72, 70,  $7/\sqrt{35}$ )`



The probability that the sample mean is between 68 and 72 is 0.909.

Example 2: Find Probability Greater Than One Value

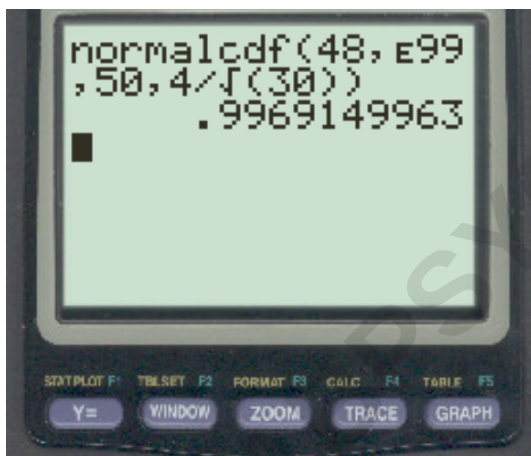
A distribution has a mean of 50 and a standard

deviation of 4. If we select a random sample of size $n = 30$, find the probability that the sample mean is greater than 48.

We can use the following syntax on the TI-84:

`normalcdf(48, E99, 50,  $4/\sqrt{30}$ )`

Note: You can access the "E" symbol by pressing 2nd and then pressing the , button.



The probability that the sample mean is greater than 48 is 0.9969.

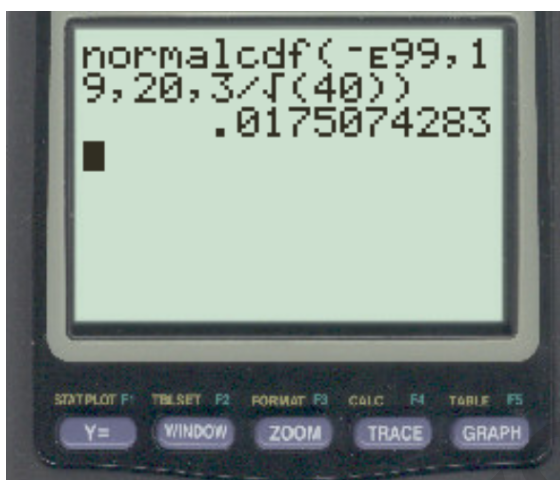
Example 3: Find Probability Less Than One Value

A distribution has a mean of 20 and a standard deviation of 3. If we select a random sample of size $n =$

40, find the probability that the sample mean is less than 19.

We can use the following syntax on the TI-84:

normalcdf(-E99, 19, 20, $3/\sqrt{40}$)



The probability that the sample mean is less than 19 is 0.0175.