CI Worksheet for One Populations, sigma unknown

Return to Confidence Interval; One population; sigma unknown

On this page we will see a number of situations with related questions. In each case, this page will give the answers to those questions. Your task is to find those same answers by inspecting the given information and/or by using a calculator or computer to produce those desired values.

Case 1:

We have a sample of size 48 from a population that we know has an unknown standard deviation. The mean of that sample is 75.86 and the standard deviation of the sample is 9.16.

(1) What is the point estimate for the mean, μ_1, of the population? (**Answer= 75.86)**

(2) Considering the size of our sample, what is our best estimate of the standard deviation of sample means for sample of this size? **(Answer= 1.3221)**

(3) We want a 78% confidence interval. We know that the sample means are distributed as a Student's t. with a certain number of degrees of freedom. What is the value we need to use for the degrees of freedom in this case? **(Answer= 47**)

What is the **t** value, for that number of degrees of freedom, that we will use so that in the Student's t distribution there is 78% of the area between $^{-}$**t** and **t**? **(Answer= 1.2431** or **-1.2431)**

(4) Using all of those results, what is the 78% confidence interval for the population mean? **(Answer= (74.2165, 77.5035)**

(5) What is the value of the margin of error for that confidence interval? **(Answer= 1.6435)**

Case 2:

We have a sample of size 50 from a population that we know has an unknown standard deviation. The mean of that sample is 150.15 and the standard deviation of the sample is 10.69.

(6) What is the point estimate for the mean, μ_1, of the population? (**Answer=150.15)**

(7) Considering the size of our sample, what is our best estimate of the standard deviation of sample means for sample of this size? **(Answer= 1.5118)**

(8) We want a 94% confidence interval. We know that the sample means are distributed as a Student's t. with a certain number of degrees of freedom. What is the value we need to use for the degrees of freedom in this case? **(Answer= 49**)

What is the **t** value, for that number of degrees of freedom, that we will use so that in the Student's t distribution there is 94% of the area between $^{-}$**t** and **t**? **(Answer= 1.9253** or **-1.9253)**

(9) Using all of those results, what is the 94% confidence interval for the population mean? **(Answer= (147.2393, 153.0607)**

(10) What is the value of the margin of error for that confidence interval? **(Answer= 2.9107)**

Case 3:

We have a sample of size 26 from a population that we know has an unknown standard deviation. The mean of that sample is 3.88 and the standard deviation of the sample is 48.56.

(11) What is the point estimate for the mean, μ_1, of the population? (**Answer= 3.88)**

(12) Considering the size of our sample, what is our best estimate of the standard deviation of sample means for sample of this size? **(Answer= 9.5234)**

(13) We want a 88% confidence interval. We know that the sample means are distributed as a Student's t. with a certain number of degrees of freedom. What is the value we need to use for the degrees of freedom in this case? **(Answer= 25**)

What is the **t** value, for that number of degrees of freedom, that we will use so that in the Student's t distribution there is 88% of the area between $^{-}$**t** and **t**? **(Answer= 1.6098** or **-1.6098)**

(14) Using all of those results, what is the 88% confidence interval for the population mean? **(Answer= (-11.4507, 19.2107)**

(15) What is the value of the margin of error for that confidence interval? **(Answer= 15.3307)**

Case 4:

We have a population with an uknown standard deviation. We draw a random sample from that population. Here is that sample:

Table 1: Sample from Population 4.1

73.6	69.9	57.4	63.5	60.9	59.0	66.3	54.3	63.2	68.4	68.9	79.1	61.8	68.7	71.7	68.5	58.7	70.2	71.0	70.4
71.1	52.3	54.8	69.3	66.5	66.6	66.8	60.8	66.8	62.3	58.1	68.4	60.5	64.4	72.7					

You can generate this set of data using the command **gnrnd4(1179063404,7100655).**

(16) What is the sample size of the sample? **(Answer= 35)**

(18) What is the sample mean of the sample? **(Answer= 65.3400)**

(19) What is the standard deviation of the sample? **(Answer= 6.0901)**

(20) What is the point estimate for the population mean? (**Answer=65.3400)**

(21) Considering the size of our sample, what is the standard deviation of sample means for sample of this size? **(Answer= 1.0294)**

(22) We want a 94% confidence interval. We know that the sample means are distributed as a Student's t with an appropriate number of degrees of freedom. What is the number of degrees of freedom in this case? **(Answer= 34)**

What is the **t** value that we will use so that in a Student's t distribution there is 94% of the area between $^{-}$**t** and **t**? **(Answer= 1.9457** or **-1.9457)**

(23) Using all of those results, what is the 94% confidence interval for the population mean? **(Answer= (63.3371, 67.3429)**

(24) What is the value of the margin of error for that confidence interval? **(Answer= 2.0029)**

Case 5:

We have a population with an uknown standard deviation. We draw a random sample from that population. Here is that sample:

Table 1: Sample from Population 5.1																	
-66.5	-68.9	-82.2	-76.5	-80.8	-79.0	-74.3	-78.9	-74.0	-85.5	-72.1	-68.2	-78.3	-74.8	-74.1	-70.9	-68.6	-68.5
-73.8	-84.3	-66.6	-75.2	-75.1	-86.0	-75.2	-72.3	-66.8	-68.0	-74.5	-76.8	-70.8	-73.4	-77.5	-73.9	-62.1	-76.2
-73.6	-71.4	-77.3	-74.0	-72.4	-73.1	-76.3	-73.5	-86.6	-74.4	-73.8	-81.5	-82.0	-73.5				

You can generate this set of data using the command **gnrnd4(6365034904,5400755).**

(25) What is the sample size of the sample? **(Answer= 50)**

(27) What is the sample mean of the sample? **(Answer= -74.6800)**

(28) What is the standard deviation of the sample? **(Answer= 5.2856)**

(29) What is the point estimate for the population mean? (**Answer=-74.6800)**

(30) Considering the size of our sample, what is the standard deviation of sample means for sample of this size? **(Answer= 0.7475)**

(31) We want a 88% confidence interval. We know that the sample means are distributed as a Student's t with an appropriate number of degrees of freedom. What is the number of degrees of freedom in this case? **(Answer= 49)**

What is the **t** value that we will use so that in a Student's t distribution there is 88% of the area between $^{-}$**t** and **t**? **(Answer= 1.5824** or **-1.5824)**

(32) Using all of those results, what is the 88% confidence interval for the population mean? **(Answer= (-75.8628, -73.4972)**

(33) What is the value of the margin of error for that confidence interval? **(Answer= 1.1828)**

Case 6:

We have a population with a normal distribution but an uknown standard deviation. We draw a random sample from that population. Here is that sample:

Table 1: Sample from Population 6.1																	
13.1	17.4	14.3	-29.8	2.3	6.5	30.1	21.2	0.2	26.0	-8.8	32.5	-24.5	27.8	12.7	19.0	-4.7	-9.5
-22.9	-18.8	20.8	8.9	-10.2	-24.4	19.9	12.9	18.3	11.9	5.0	-15.9						

You can generate this set of data using the command **gnrnd4(1179402904,15700023).**

(34) What is the sample size of the sample? **(Answer= 30)**

(36) What is the sample mean of the sample? **(Answer= 5.0433)**

(37) What is the standard deviation of the sample? **(Answer= 18.0326)**

(38) What is the point estimate for the population mean? (**Answer=5.0433)**

(39) Considering the size of our sample, what is the standard deviation of sample means for sample of this size? **(Answer= 3.2923)**

(40) We want a 98% confidence interval. We know that the sample means are distributed as a Student's t with an appropriate number of degrees of freedom. What is the number of degrees of freedom in this case? **(Answer= 29)**

What is the **t** value that we will use so that in a Student's t distribution there is 98% of the area between ⁻**t** and **t**? **(Answer= 2.4620** or **-2.4620)**

(41) Using all of those results, what is the 98% confidence interval for the population mean? **(Answer= (-3.0624, 13.1490)**

(42) What is the value of the margin of error for that confidence interval? **(Answer= 8.1057)**

Case 7:

We have a population with an uknown standard deviation. We draw a random sample from that population. Here is that sample:

Table 1: Sample from Population 7.1														
37.4	136.8	-201.3	218.9	-8.7	-16.4	-267.8	-224.4	-168.8	-184.3	108.7	-185.2	-52.5	-90.3	-61.5	-107.9
-143.3	12.8	-151.8	147.8	-22.0	-298.4	-271.1	145.7	-153.7	22.5	110.3	44.9	-192.4	-79.2	-275.6	-279.9
-225.7	-345.3	-108.0	-276.2	79.8	41.4	-209.4	-79.8	-231.3	190.4	-177.6	-80.7	-6.5	-81.4	-309.9	130.4
121.9	-299.1	90.1	-69.6	-79.1	-365.8	186.1	-119.1	-380.6	-171.0	256.1	-255.9	-385.9	-181.0	193.3	263.4
-402.2	129.4	-24.1	82.3	119.7	-66.3	-163.1	-191.9	-61.7	-162.6	112.3	155.5	-168.6	-155.9	232.4	147.8

-179.0	30.1	66.7	-276.2	-120.9	69.2	-178.4	-170.8	-159.9	-28.6	-154.9	-192.4				

You can generate this set of data using the command **gnrnd4(6437249104,157500720).**

(43) What is the sample size of the sample? **(Answer= 92)**

(45) What is the sample mean of the sample? **(Answer= -76.6174)**

(46) What is the standard deviation of the sample? **(Answer= 166.4225)**

(47) What is the point estimate for the population mean? (**Answer=-76.6174)**

(48) Considering the size of our sample, what is the standard deviation of sample means for sample of this size? **(Answer= 17.3507)**

(49) We want a 92% confidence interval. We know that the sample means are distributed as a Student's t with an appropriate number of degrees of freedom. What is the number of degrees of freedom in this case? **(Answer= 91)**

What is the **t** value that we will use so that in a Student's t distribution there is 92% of the area between $^{-}$**t** and **t**? **(Answer= 1.7705** or **-1.7705)**

(50) Using all of those results, what is the 92% confidence interval for the population mean? **(Answer= (-107.3361, -45.8987)**

(51) What is the value of the margin of error for that confidence interval? **(Answer= 30.7187)**

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