

Confidence Interval Worksheet for Standard Deviation in One Population

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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 38 from a population known to be approximately normally distributed. The sample has a sample standard deviation of 19.000. We want to find a 81.0% confidence interval for the population standard deviation.

- (1) Give the best point estimate for the standard deviation of the population. **(Answer: $p = 19.0000$)**
- (2) We know that the sample standard deviation will have a χ^2 distribution. Give the number of degrees of freedom for that χ^2 distribution for this problem. **(Answer: $df = 37$)**
- (3) We want to find a 81.0% confidence interval for the population standard deviation. What is the χ^2 value that has 0.0950 to the left of that value? **(Answer: $\chi^2 = 26.2931$)**
- (4) What is the χ^2 value that has 0.0950 to the right of that value? **(Answer: $\chi^2 = 48.6624$)**
- (5) Give the confidence interval. **(Answer: $CI = (16.5675, 22.5389)$)**

Case 2:

We have a sample of size 27 from a population known to be approximately normally distributed. The sample has a sample standard deviation of 55.500. We want to find a 86.0% confidence interval for the population standard deviation.

- (6) Give the best point estimate for the standard deviation of the population. **(Answer: $p = 55.5000$)**
- (7) We know that the sample standard deviation will have a χ^2 distribution. Give the number of degrees of freedom for that χ^2 distribution for this problem. **(Answer: $df = 26$)**
- (8) We want to find a 86.0% confidence interval for the population standard deviation. What is the χ^2 value that has 0.0700 to the left of that value? **(Answer: $\chi^2 = 16.2499$)**
- (9) What is the χ^2 value that has 0.0700 to the right of that value? **(Answer: $\chi^2 = 37.3154$)**
- (10) Give the confidence interval. **(Answer: $CI = (46.3272, 70.2027)$)**

Case 3:

We have a sample of size 109 from a population known to be approximately normally distributed. The sample has a sample standard deviation of 16.500. We want to find a 99.0% confidence interval for the population standard deviation.

- (11) Give the best point estimate for the standard deviation of the population. **(Answer: $p = 16.5000$)**
- (12) We know that the sample standard deviation will have a χ^2 distribution. Give the number of degrees of freedom for that χ^2 distribution for this problem. **(Answer: $df = 108$)**
- (13) We want to find a 99.0% confidence interval for the population standard deviation. What is the χ^2 value that has 0.0050 to the left of that value? **(Answer: $\chi^2 = 73.8989$)**
- (14) What is the χ^2 value that has 0.0050 to the right of that value? **(Answer: $\chi^2 = 149.5994$)**
- (15) Give the confidence interval. **(Answer: $CI = (14.0194, 19.9470)$)**

Case 4:

In the following table we have a sample taken from a population that is known to be approximately normally distributed.

| Table of sample values | | | | | | | | | | | | | | |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 48.4 | 40.1 | 41.6 | 50.6 | 37.3 | 43.3 | 42.1 | 42.7 | 38.8 | 39.6 | 43.6 | 50.7 | 43.3 | 44.6 | 39.5 |
| 39.6 | 39.9 | 43.3 | 50.4 | 45.0 | 46.9 | 45.2 | 47.3 | 36.7 | 42.2 | 47.5 | 46.2 | 37.1 | 48.1 | 37.3 |

| | | | | | | | | | | | | | | |
|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|
| 39.1 | 34.7 | 36.9 | | | | | | | | | | | | |
|------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|

You can generate this set of data using the command **gnrnd4(1517043204,4000437)**.

We are interested in making a statement about the standard deviation of the population. In particular, we want to construct a 93.0% confidence interval for the population standard deviation.

- (16) Give the size of the sample. **(Answer: n = 33)**
 (17) Give the standard deviation of the sample. **(Answer: p = 4.4576)**
 (18) Give the best point estimate for the standard deviation of the population. **(Answer: p = 4.4576)**
 (19) We know that the sample standard deviation will have a χ^2 distribution. Give the number of degrees of freedom for that χ^2 distribution for this problem. **(Answer: df = 32)**
 (20) We want to find a 93.0% confidence interval for the population standard deviation. What is the χ^2 value that has 0.0350 to the left of that value? **(Answer: $\chi^2 = 19.1133$)**
 (21) What is the χ^2 value that has 0.0350 to the right of that value? **(Answer: $\chi^2 = 47.9183$)**
 (22) Give the confidence interval. **(Answer: CI = (3.6427, 5.7678))**

Case 5:

In the following table we have a sample taken from a population that is known to be approximately normally distributed.

| Table of sample values | | | | | | | | | | | | | | |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 49.7 | 40.9 | 47.9 | 39.4 | 45.8 | 55.2 | 47.4 | 44.4 | 44.9 | 42.0 | 45.3 | 48.3 | 48.6 | 50.0 | 45.1 |
| 47.6 | 48.0 | 44.1 | 49.1 | 49.0 | 51.5 | 50.0 | 38.5 | 48.0 | 46.8 | 46.4 | 49.2 | 41.6 | 45.4 | 47.5 |
| 48.3 | 40.8 | 47.6 | 49.2 | 49.0 | 45.8 | 40.5 | 46.6 | 37.1 | 41.7 | 52.3 | 46.8 | 54.7 | 49.2 | 42.7 |
| 49.0 | 51.9 | 38.3 | 51.0 | 46.4 | | | | | | | | | | |

You can generate this set of data using the command **gnrnd4(1197084904,4500468)**.

We are interested in making a statement about the standard deviation of the population. In particular, we want to construct a 83.0% confidence interval for the population standard deviation.

- (23) Give the size of the sample. **(Answer: n = 50)**
 (24) Give the standard deviation of the sample. **(Answer: p = 4.1027)**
 (25) Give the best point estimate for the standard deviation of the population. **(Answer: p = 4.1027)**
 (26) We know that the sample standard deviation will have a χ^2 distribution. Give the number of degrees of freedom for that χ^2 distribution for this problem. **(Answer: df = 49)**
 (27) We want to find a 83.0% confidence interval for the population standard deviation. What is the χ^2 value that has 0.0850 to the left of that value? **(Answer: $\chi^2 = 36.0825$)**
 (28) What is the χ^2 value that has 0.0850 to the right of that value? **(Answer: $\chi^2 = 63.0932$)**
 (29) Give the confidence interval. **(Answer: CI = (3.6155, 4.7810))**

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