# BASIC STATISTICS-2

a) **99% Confidence Interval Using Sample Standard Deviation**

To construct a 99% confidence interval for the mean durability of print-heads, we'll follow these steps:

**STEP 1:** Calculate the sample mean, sample standard deviation and sample size (n)

Sample mean is calculated as (

Sample standard deviation is calculated as (s):

where, are individual sample points, ***n*** is the sample size and (***n-1***) is the degree of freedom.

**STEP 2:** Determine the t-value for 99% confidence level

As the sample size is small and population standard deviation is unknown, t-distribution is used as it accounts for the additional variability for small samples when estimating the population standard deviation.

The degree of freedom is 14 here, and the critical t-value is taken from the t-distribution table.

**STEP 3:**  Calculate the Margin of Error (MOE)

The margin of error is calculated as:

**STEP 4:** Calculate the Confidence Interval

The 99% Confidence interval for the population mean µ is:



**RESULTS:**

**Sample Mean:** 1.24 million characters

**Sample Standard Deviation:** 0.19 million characters

**t-Critical Value:** -0.01

**Margin of Error:** -0.0

**99% Confidence Interval:** (1.2393030255618902, 1.238030307771443) Million characters

b) **99% Confidence Interval Using Known Population Standard Deviation**

If the population standard deviation is known then z-distribution can be used instead of t-distribution.

**STEP 1**: Calculate the sample mean (

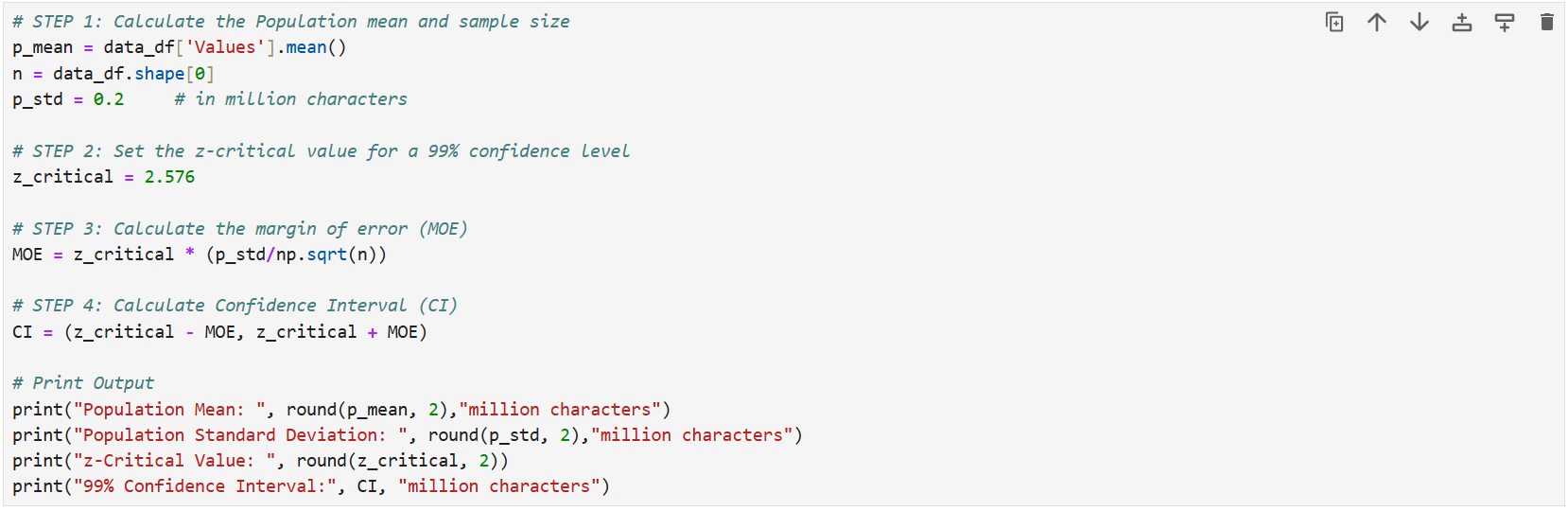
**STEP 2**: Determine the z-value for 99% confidence level

The z-value corresponding to 99% confidence level is approximately

**STEP 3:** Calculate the Margin of Error (MOE)

**STEP 4:** Calculate the Confidence Interval

The 99% Confidence interval for the population mean µ is:



**RESULTS:**

**Population Mean**: 1.24 million characters

**Population Standard Deviation**: 0.2 million characters

**z-Critical Value**: 2.58

**99% Confidence Interval**: (2.4429759320022626, 2.7090240679977375) million characters