Solution:

To construct the confidence intervals requested, we'll follow these steps:

a. Building a 99% Confidence Interval Using Sample Standard Deviation:

1. Calculate the sample mean and sample standard deviation (s).
2. Determine the sample size (n).
3. Find the appropriate t-score for a 99% confidence level with n-1 degrees of freedom.
4. Calculate the confidence interval.

b. Building a 99% Confidence Interval Using Known Population Standard Deviation:

1. Calculate the sample mean.
2. Determine the sample size (n).
3. Find the appropriate z-score for a 99% confidence level.
4. Calculate the confidence interval, where is the population standard deviation.

Let's proceed with the calculations:

Given data:

* Sample: 1.13,1.55,1.43,0.92,1.25,1.36,1.32,0.85,1.07,1.48,1.20,1.33,1.18,1.22,1.291.13,1.55,1.43,0.92,1.25,1.36,1.32,0.85,1.07,1.48,1.20,1.33,1.18,1.22,1.29

a. Using Sample Standard Deviation:

1. Sample mean =1.13+1.55+...+1.22+1.2915*x*ˉ=151.13+1.55+...+1.22+1.29​
2. Sample standard deviation (s): Calculate using the formula for sample standard deviation.
3. Sample size (n): 15*n*=15.
4. Find t-score for a 99% confidence level with *n*−1 degrees of freedom.
5. Calculate the confidence interval using the formula.

b. Using Known Population Standard Deviation:

1. Sample mean is already calculated.
2. Sample size (n) is already known.
3. Find the appropriate z-score for a 99% confidence level.
4. Calculate the confidence interval using the formula.

Let's start with part (a):

a. Using Sample Standard Deviation:

1. Sample mean =1.13+1.55+...+1.22+1.2915*x*ˉ=151.13+1.55+...+1.22+1.29​ =19.9715=1519.97​ ≈1.331≈1.331
2. Sample standard deviation (s): Calculate using the formula for sample standard deviation.

=*n*−1∑*i*=1*n*​(*xi*​−*x*ˉ)2​​

=(1.13−1.331)2+...+(1.29−1.331)214*s*=14(1.13−1.331)2+...+(1.29−1.331)2​​

≈0.208*s*≈0.208

1. Sample size (n): 15*n*=15.
2. Find t-score for a 99% confidence level with *n*−1 degrees of freedom. For 99% confidence level with 14 degrees of freedom, the t-score is approximately 2.977.
3. Calculate the confidence interval using the formula: Confidence Interval=*x*ˉ±(*n*​*t*×*s*​)

Confidence Interval=1.331±(2.977×0.20815)Confidence Interval=1.331±(15​2.977×0.208​)

Confidence Interval≈1.331±0.201Confidence Interval≈1.331±0.201

Confidence Interval≈(1.130,1.532)Confidence Interval≈(1.130,1.532)

Now, for part (b):

b. Using Known Population Standard Deviation:

1. Sample mean is already calculated.
2. Sample size (n) is already known.
3. For a 99% confidence level, the z-score is approximately 2.576.
4. Calculate the confidence interval using the formula: Confidence Interval=*x*ˉ±(*n*​*Z*×*σ*​)

Confidence Interval=1.331±(2.576×0.215)Confidence Interval=1.331±(15​2.576×0.2​)

Confidence Interval≈1.331±0.176Confidence Interval≈1.331±0.176

Confidence Interval≈(1.155,1.507)Confidence Interval≈(1.155,1.507)

So, the 99% confidence interval for the mean number of characters printed before failure is approximately (1.130, 1.532) using the sample standard deviation, and (1.155, 1.507) using the known population standard deviation.