**Task A: Build 99% Confidence Interval Using Sample Standard Deviation**

**Step 1: Mean and Standard Deviation**

1. **Sample Data**:

Durability = [1.13,1.55,1.43,0.92,1.25,1.36,1.32,0.85,1.07,1.48,1.20,1.33,1.18,1.22,1.29]

1. **Sample Size (n)**:

n=15

1. **Calculate Sample Mean**

x = Durability[] / 15

= 1.22

X = 1.13,1.55,1.43,0.92,1.25,1.36,1.32,0.85,1.07,1.48,1.20,1.33,1.18,1.22,1.29 / 15 = 1.22

1. **Calculate Sample Standard Deviation**

S = 0.21

**Step 2: Determine the t-Score**

1. Since the sample size is small n < 30 we use the t-distribution.
2. For a 99% confidence level and n−1=14 degrees of freedom, we find the t-score from the

t-table or using statistical software.

1. Therefor the t-value for 99% confidence interval is 2.9 ~ 3

**Step 3: Margin of Error**

Me= t-value \* s/root(n)

= 2.9 \* 8 /root(15)

= 2.9 \* 8/3

= 0.18

**Step 4: Construct the Confidence Interval**

Ci = (x-Me, x+Me)

Ci = (1.22 – 0.18, 1.22 + 0.18)

Ci = (1.04 , 1.41)

**Task B: Build 99% Confidence Interval Using Known Population Standard Deviation**

**Step 1: Use the Known Population Standard Deviation**

Given: Population Standard Deviation (a) = 0.2 million characters.

**Step 2: Calculate the Margin of Error (ME)**

ME = critical z-value \* a/root(n)

For a 99% confidence level, the critical z-value is approximately 2.57.

ME = 2.57 \* 0.2/root(15) = 0.10

**Step 3: Construct the Confidence Interval**

CI = (x −ME , x + ME)

CI = (1.22 −0.10 , 1.22 + 0.10)

CI = (1.12 , 1.33)

**Summary**

* **Task A** standard deviation : CI = (1.04, 1.41)
* **Task B** standard deviation : CI = (1.12, 1.33)