Z and T INTERVALS

These tests are used to construct a confidence interval for a population mean (μ).

When σ is known, use a Z-Interval; when σ is unknown, use a T-Interval.

The tension readings in millivolts (mV) from a random sample of 20 screens from a single day's production are as follows:

269.5	297.0	269.6	283.3	304.8	280.4	233.5	257.4	317.5	327.4
264.7	307.7	310.0	343.3	328.1	342.6	338.8	340.1	374.6	336.1

Construct and interpret a 90% confidence interval for the mean tension of all the screens produced on this day.

P) STATE POPULATION PARAMETER:

μ = mean tension of all screens produced this day (mV)

A) VERIFY CONDITIONS REQUIRED FOR TEST:

a) Random

It was stated that a random sample was used…

b) Normal parent population or large sample size or justification for normality

Since the sample size is less than 30, the sample data needs to be examined… a boxplot and normal probability indicates a Normal distribution with no outliers

c) Independence

Total number of screens produced > 10n > 10(20) >200?

I) CONSTRUCT INTERVAL

Since σ is unknown, we will construct a T-Interval:

a) USE *t* DISTRIBUTION TABLE:

i) Determine mean ($\bar{x}$) and standard deviation (s)

$\bar{x}$ = 306.32 s = 36.21

ii) Determine *t** using (20-1) degrees of freedom

*t** = 1.729

iii) Construct confidence interval

$$90\%\ CI = \bar{x} \pm t^* \frac{s}{\sqrt{n}}$$

$$90\%\ CI = 306.32 \pm 1.729 \frac{36.21}{\sqrt{20}}$$

$$90\%\ CI = 306.32 \pm 14 = (292.32, 320.32)$$

b) USE CALCULATOR

STATS ⟶ TESTS ⟶ T Interval = (292.32, 320.32)

S) STATE CONCLUSION:

We are 90% confident that the interval from 292.32 mV to 320.21 mV captures the true mean tension of all screens produced that day.