See example below

# Hypothesis Testing Worksheet

Null Hypothesis: $H_0: \mu = 2.3$

Significance Level: $\alpha = 0.01$ (as decimal)

Alternate Hypothesis: $H_1: \mu \neq 2.3$ (≠ or < or >)

1- Sample Mean: $\bar{X} = 2.51$

2- Number of Samples: $n = 8$

3- Original Standard Deviation: $\sigma = 0.3$

4- New Standard Deviation: $= \frac{\sigma}{\sqrt{n}} \longrightarrow = \frac{0.3}{\sqrt{8}} = 0.10606601$

Do ONE:

P-Value: .... Left-Tailed: $=$ Prob(Less than $\bar{x}$) = (NORM.DIST)

Right-Tailed: $=$ Prob(More than $\bar{x}$) = (1 - NORM.DIST)

≠ Two-Tailed: $= 2 \cdot$ Prob(... than $\bar{x}$) =

Less than if $\bar{x} < \mu$
More than if $\bar{x} > \mu$

Conclusion:

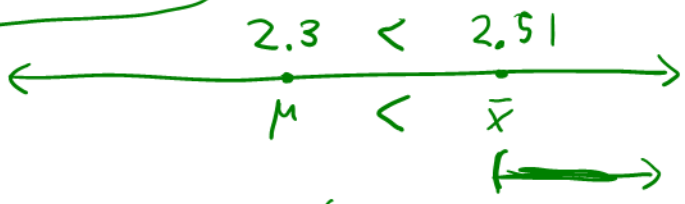
If P-Value > Significance Level then: ACCEPT Null Hypothesis

If P-Value < Significance Level then: REJECT Null Hypothesis

Final Answer:

0.0474 > 0.01 so

(*) Accept Null Hypothesis




P-VAL = 2 · P(More than 2.51)

1-NORM.DIST(2.51, 2.3, .106, true)

P-VAL

= 2 · 0.0237

= 0.0474

**From Brase and Brase 5th**

The Environmental Protection Agency has been studying Miller Creek regarding ammonia nitrogen concentration. For many years, the concentration has been 2.3 mg/l. However, a new golf course and housing developments are raising concern that the concentration may have changed because of lawn fertilizer. Any change (either an increase or a decrease) in the ammonia nitrogen concentration can affect plant and animal life in and around the creek (Reference: *EPA Report* 832-R-93-005). Let $x$ be a random variable representing ammonia nitrogen concentration (in mg/l). Based on recent studies of Miller Creek, we may assume that $x$ has a normal distribution with $\sigma = 0.30$. Recently, a random sample of eight water tests from the creek gave the following $x$ values.

2.1 2.5 2.2 2.8 3.0 2.2 2.4 2.9

The sample mean is $\bar{x} \approx 2.51$.

Let us construct a statistical test to examine the claim that the concentration of ammonia nitrogen has changed from 2.3 mg/l. Use level of significance $\alpha = 0.01$.