

Ans-1. Given: $\mu_0 = 0.8 \text{ secs}$ $n = 28$

$$\hat{\mu}_{\text{sample}} = 1.0 \text{ sec}$$

$$\hat{\sigma}_{\text{sample}} = 0.3 \text{ sec}$$

To find $H_0: \mu = \mu_0$ vs $H_1: \mu \neq \mu_0$

This is a 2 tailed test and we would use T-test for the same (for hypothesis testing)

test statistic

$$\frac{\hat{\mu} - \mu_0}{\sqrt{\hat{\sigma}^2/n}} \bigg|_{\mu_0} \sim (n-1)$$

substituting the values we get

$$\frac{1 - 0.8}{\sqrt{\frac{0.3 \times 0.3}{28}}} = 3.527668$$

now the level of significance (α) = 0.05 and the calculated p value is 0.001521206.

$\therefore p_{\text{calculated}} < \alpha$ hence we reject the null hypothesis.

Ans-2 we are given the std. deviations and the data so the hypothesis can be formulated as:

$$H_0: \sigma \geq 0.4 \text{ vs } H_1: \sigma < 0.4$$

and it is a left tailed value
for testing of std. deviations, the statistic follows chi-square distribution.

$$\frac{(n-1)s^2}{\sigma^2} \sim \chi^2_{(n-1)}$$

$$\text{std. deviations (samples)} = 0.004055175$$

substituting the values we get

$$\frac{9 \times 1.644 \times 10^{-5}}{(0.04055175)^2} \approx 0.00925$$

calculating the pvalue

$$P_{\text{calculated}} = 1.879238 \times 10^{-19} < \alpha (0.05)$$

Hence we reject null hypothesis

Ans-3.

Let $\mu_{\text{smoker}} \rightarrow$ average B.P of smokers

$\mu_{\text{nonsmoker}} \rightarrow$ average B.P of non smokers

we need to test

$$H_0: \mu_{\text{smoker}} = \mu_{\text{nonsmoker}} \quad \text{VS} \quad H_1: \mu_{\text{smoker}} \neq \mu_{\text{nonsmoker}}$$

It is a 2tailed test and we would be using T-test for the same

test statistic $\frac{\mu_{\text{smoker}} - \mu_{\text{nonsmoker}}}{\sqrt{\frac{\sigma_{\text{smoker}}^2}{n_{\text{smoker}}} - \frac{\sigma_{\text{nonsmoker}}^2}{n_{\text{nonsmoker}}}}}$

$\sim t \left(\frac{\text{no. of smoker} + \text{no. of non smoker}}{2} \right)$

$$\sigma_{\text{smoker}} = 5.2739$$

$$\sigma_{\text{non smoker}} = 5.7325$$

$$n_{\text{smoker}} = 129.1818$$

$$n_{\text{nonsmoker}} = 123.3571$$

substituting the value we get

$$t\text{-stat} = 2.523931$$

now we would calculate the pvalue

$$P_{\text{observed}} = 0.01863266 < \alpha (0.05)$$

Hence we reject null hypothesis