

CI (4) To assess accuracy of lab scale, std wt = 1gm is repeatedly weighed 4 times. Measurements: 0.95, 1.02, 1.01, 0.98

Assume true wt = 1gm and are ND with a mean  $\mu$

(a) Use data to compute a 95% CI for  $\mu$ .

$$N=4 \quad \mu = (0.95 + 1.01 + 1.02 + 0.98) / 4 = 0.99$$

$$\sigma \text{ (std dev of sample from excel)} = \text{STDEV.S} = 0.0316 = 0.032$$

$$\alpha = 1 - \frac{CI}{100} = 1 - \frac{95}{100} = 1 - 0.95 = 0.05; \quad \boxed{\alpha/2 = 0.025}$$

Since sample is small, T-score:  $t_{n-1, \alpha/2} = t_{(3, 0.025)} = 3.182$

$$E = \bar{x} \pm t_{n-1, \alpha/2} \frac{s}{\sqrt{n}} = 0.99 \pm 3.182 \times \frac{0.032}{2} = 0.99 \pm 0.05$$

$$E = (0.94, 1.04)$$

(b) Do these data give enough evidence at 5% Signi level that Scale is not accurate.

5% Significant level or 95% Confidence interval the value of  $\mu=1$  falls in the range of (0.94, 1.04). There is ~~no~~ evidence at 5% Significance level that scale is accurate.

CI (5) Time needed for College Students to complete a maze - ND -  $\mu = 45$  sec.

$N=9$ ; exercise vigorously for 30 min.  $SM = 49.2$  &  $\sigma_{SD} = 3.5$

$H_0(\mu=45)$  appropriate test of hypo at 5% level of Significance.

$H_1 \neq (\mu \neq 45)$  CI = 95%  $N=9$   $\mu_{SM} = 49.2$   $\sigma_{SD} = 3.5$   $\mu = 45$  sec.

Since the sample is small, go with t-interval

$$E = (\bar{x}) \pm t_{n-1, \alpha/2} \frac{\sigma}{\sqrt{N}}$$

$$T = \frac{\bar{x} - \mu}{\sigma / \sqrt{N}} = \frac{49.2 - 45}{3.5 / \sqrt{9}} = \frac{4.2 \times 3}{3.5} = 3.6$$

$$t_{n-1, \alpha/2} = 2.306$$

|T| is 3.6 > 2.306,  $\mu=45$  is rejected  $\Rightarrow$  Means to say that there is ~~sig~~ evidence at 5% S.L that mean to complete maze is changed after exercise.

CI (9)

Retail \$ of brand jeans = 150  
 price of 16 retailers is an avg of \$141. with  $\sigma = 4$   
 It sample is random & N.D. construct a 95% CI for avg. sale

$$\mu = 141, N = 16, \sigma = 4$$

$$\alpha = 1 - \frac{95}{100} = 1 - 0.95 = 0.05$$

$$\alpha/2 = 0.025$$

Since sample is small ( $< 30$ )  $\Rightarrow$  T-interval  $T_{15, 0.025} = 2.1314$

$$(T) = \bar{X} \pm 2.1314 \frac{\sigma}{\sqrt{N}} \Rightarrow 141 \pm 2.1314 \times \frac{4}{\sqrt{16}} = \{138.87, 143.13\}$$

$$\Rightarrow \{138.87, 143.13\}$$

CI (7)