

Confidence Intervals

one-sample t confidence interval $\bar{x} \pm t^* \frac{s}{\sqrt{n}}$

1. $n=41$

$\bar{x} = 14.4 \text{ mg}$

$s = 0.4 \text{ mg}$

$t_{0.95, 40} = 2.021$

$\bar{x} \pm \frac{(2.021)(0.4)}{\sqrt{41}} = \bar{x} \pm 0.1263$

a. $(14.27, 14.53)$

b. 14.4

c. 0.4

d. 2.021

e. 0.1263

f. $n=62$

use $z^* = 1.96$ for 95% confidence

$M = 0.1 = \frac{(1.96)(0.4)}{\sqrt{n}}$

$n = \left[\frac{(1.96)(0.4)}{0.1} \right]^2 = 61.47 \approx \underline{\underline{62}}$
 new margin of error

2. $n=16$

$\bar{x} = 15.3$

$s = 3.2$

$t_{0.95, 15} = 2.131$

a. $\bar{x} \pm \frac{(2.131)(3.2)}{\sqrt{16}} = \bar{x} \pm 1.7048$
 $(13.6, 17)$

b. $M = 1.7048$

c. $n = \left[\frac{(1.96)(3.2)}{0.5} \right]^2 = 157.4 \approx 158$

new margin of error

$n = 158$

3. $n=10$

$t_{0.95,9} = 2.262$

$\bar{x} = 98.44^\circ\text{F}$

$S = 0.30^\circ\text{F}$

$C = 95$

$$\bar{x} \pm \frac{(2.262)(0.3)}{\sqrt{10}} = \bar{x} \pm 0.2146$$

$(98.23, 98.65)$

4. $n=20$

$t_{0.98,19} = 2.539$

$\bar{x} = 2.4 \text{ hr}$

$S = 1.3 \text{ hr}$

$C = 98$

$$\bar{x} \pm \frac{(2.539)(1.3)}{\sqrt{20}} = \bar{x} \pm 0.7381$$

$(1.66, 3.14)$

5. $n=4400$

$t_{0.98, >1000} = 2.326$

$\bar{x} = 5.15 \text{ yr}$

$S = 1.68 \text{ yr}$

$C = 98$

$$\bar{x} \pm \frac{(2.326)(1.68)}{\sqrt{4400}} = 0.0589$$

$(5.09, 5.21)$

6. $n=60$

$t_{0.95,59} = 2$

$\bar{x} = 4 \text{ hr}$

$S = 0.75 \text{ hr}$

$C = 95$

\uparrow
[use 60]

$$\bar{x} \pm \frac{(2)(0.75)}{\sqrt{60}} = \bar{x} \pm 0.1936$$

$(3.8064, 4.1936)$

7. $n=20$

$t_{0.95,19} = 2.093$

$\bar{x} = 29.8$

$S = 6.7$

$C = 95$

$$\bar{x} \pm \frac{(2.093)(6.7)}{\sqrt{20}} = \bar{x} \pm 3.1357$$

$(26.66, 32.94)$

$$8. n = 50$$

$$\bar{X} = 0.72 \text{ sec}$$

$$S = 0.022 \text{ sec}$$

$$C = 99$$

$$t_{0.99, 49} = 2.678$$

↑
[use 50]

$$\bar{X} \pm \frac{(2.678)(0.022)}{\sqrt{50}} = \bar{X} \pm 0.008$$

$$(0.712, 0.728)$$

$$9. n = 45$$

$$\bar{X} = \$340$$

$$S = \$62$$

$$C = 90$$

$$t_{0.9, 44} = 1.68$$

↑ use in between 40 and 50

$$\bar{X} \pm \frac{(1.68)(62)}{\sqrt{45}} = \bar{X} \pm 15.5273$$

$$(324.47, 355.53)$$

$$10. n = 25$$

$$\bar{X} = 480^\circ\text{F}$$

$$S = 11^\circ\text{F}$$

$$C = 95$$

$$t_{0.95, 24} = 2.064$$

$$\bar{X} \pm \frac{(2.064)(11)}{\sqrt{25}} = \bar{X} \pm 4.54$$

$$(475.46, 484.54)$$

$$11. n = 27$$

$$\bar{X} = 3.8 \text{ days}$$

$$S = 1.2$$

$$C = 98$$

$$t_{0.98, 26} = 2.479$$

$$\bar{X} \pm \frac{(2.479)(1.2)}{\sqrt{27}} = \bar{X} \pm 0.5725$$

$$(3.23, 4.37)$$

$$12, n=100$$

$$\bar{x} = \$2130$$

$$s = \$578$$

$$C=99$$

$$t_{0.99, 99} = 2.626$$

$$\bar{x} \pm \frac{(2.626)(578)}{\sqrt{100}} = \bar{x} \pm 151.7828$$

$$(1978.2, 2281.8)$$

$$13, n=30$$

$$\bar{x} = \$7.00$$

$$s = \$0.80$$

$$C=90$$

$$t_{0.9, 29} = 1.699$$

$$\bar{x} \pm \frac{(1.699)(0.8)}{\sqrt{30}} = \bar{x} \pm 0.2482$$

$$(6.75, 7.25)$$