Betrouwbaarheids Intervallen.

(93) (a) $\bar{x} = 100.05$

(b) 90% twee-zijdig betrouwbaarheids interval:

$\bar{x} = 100.05 \quad \sigma = 3 \quad n = 20 \quad \alpha = 0.1$

$$\bar{x} - \frac{\sigma \cdot z_{\alpha/2}}{\sqrt{n}} < \mu < \bar{x} + \frac{\sigma \cdot z_{\alpha/2}}{\sqrt{n}}$$

$$\Rightarrow 100.05 - \frac{3(1.645)}{\sqrt{20}} < \mu < 100.05 + \frac{3(1.645)}{\sqrt{20}}$$

$$\Rightarrow \boxed{98.947 < \mu < 101.153}$$

(c) 95% linkseenzijdig:

$$\mu > \bar{x} - \frac{\sigma \cdot z_{\alpha}}{\sqrt{n}}$$

$$\Rightarrow \mu > 100.05 - \frac{3(1.645)}{\sqrt{20}}$$

$$\Rightarrow \boxed{\mu > 98.947}$$

(d) Voorgedaan in de klas.

(94) $\sigma = 10 \quad \bar{x} = 1002 \quad \alpha = 0.05 \quad n = 100$

(a) 95% 2-zijdig interval:

$$\bar{x} - \frac{\sigma \cdot z_{\frac{\alpha}{2}}}{\sqrt{n}} < \mu < \bar{x} + \frac{\sigma \cdot z_{\frac{\alpha}{2}}}{\sqrt{n}}$$

$$\Rightarrow 1002 - \frac{10(1.96)}{\sqrt{100}} < \mu < 1002 + \frac{10(1.96)}{\sqrt{100}}$$

$$\Rightarrow \boxed{1000.04 < \mu < 1003.96}$$

(b) $$n \geq \frac{4\sigma^2 \cdot z^2_{\alpha/2}}{\Delta^2}$$

$$n \geq \frac{4(10)^2 (1.96)^2}{2^2}$$

$$n \geq 384.16 \qquad \boxed{n \geq 385}$$

(95) $\bar{x}$ en s^2 zelf berekenen:

(a) $\bar{x} = 1.5522 \quad s^2 = 1.0844 \times 10^{-5} \quad s = 3.293 \times 10^{-3} \quad \alpha = 1\% \quad n = 10$

$$\bar{x} - \frac{s \cdot t_{n-1}\left(\frac{\alpha}{2}\right)}{\sqrt{n}} < \mu < \bar{x} + \frac{s \cdot t_{n-1}\left(\frac{\alpha}{2}\right)}{\sqrt{n}}$$

$$1.5522 - \frac{0.003293(3.250)}{\sqrt{10}} < \mu < 1.5522 + \frac{0.003293(3.250)}{\sqrt{10}}$$

$$\boxed{1.548816 < \mu < 1.55558}$$

(95b) $n \geq \dfrac{4s^2 t_{n-1}^2\left(\frac{\alpha}{2}\right)}{\Delta^2}$

$$n \geq \frac{4(.003293)^2(3.250)^2}{(0.004)^2}$$

$n \geq 28.6$, dus minimaal 29 metingen nodig.

Er waren al 10, dus nog 19 extra nodig

(96) Gebruik $n=5$

26, 28, 22, 23, 29

$\bar{x} = 25.6$

$s = 9.3$

(a) $25.6 - \dfrac{\sqrt{9.3}(2.776)}{\sqrt{5}} < \mu < 25.6 + \dfrac{\sqrt{9.3}(2.776)}{\sqrt{5}}$

$$\boxed{21.814 < \mu < 29.386}$$

(b) Rechts eenzijdig

$$\mu < 25.6 + \frac{\sqrt{9.3}(2.132)}{\sqrt{5}}$$

$$\boxed{\mu < 28.508}$$

(97) $\Delta = 0.1 \qquad \sigma = 0.2$

$$n \geq \frac{4 \cdot \sigma^2 \cdot z_{\alpha/2}^2}{\Delta^2}$$

$$n \geq \frac{4(0.2)^2 (1.575)^2}{0.1^2}$$

$n \geq 106.09$ minimaal 107 metingen.

(98) 90% 2-zijdig interval voor σ^2

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

$$\frac{9(0.108932)}{16.919} < \sigma^2 < \frac{(9)(0.108932)}{3.32511}$$

$$0.0559 < \sigma^2 < 0.2948$$

$$\boxed{0.2364 < \sigma < 0.5430}$$

$X = 1.752$

$n = 10$

$s^2 = 0.108932$

$s = 0.33005$

(99) Gebruik $n = 5$

$26, 28, 22, 23, 29$

$s^2 = 9.3$

(a) 95% twee zijdig $\Rightarrow \alpha = 0.05$

$$\frac{4(9.3)}{11.143} < \sigma^2 < \frac{4(9.3)}{0.484}$$

$$\boxed{3.338 < \sigma^2 < 76.860}$$

(b) 90% rechts eenzijdig $\Rightarrow \alpha = 0.1$

$$\sigma^2 < \frac{4(9.3)}{0.711}$$

$$\boxed{\sigma^2 < 52.321}$$

(100) $n = 4$ $\quad 605, 620, 590, 601$

(a) 95% interval voor μ.

$\sigma^2 = 150 \quad \bar{x} = 604$

$$604 - \frac{\sqrt{150}(1.96)}{\sqrt{4}} < \mu < 604 + \frac{\sqrt{150}(1.96)}{\sqrt{4}}$$

$$\boxed{591.998 < \mu < 616.002}$$

(100b) 90% rechtseenzijdig, $\sigma^2 = 150$

$$\mu < 604 + \frac{\sqrt{150}(1.28)}{2}$$

$$\boxed{\mu < 611.838}$$

(100c) $$n \geq \frac{4(1.96)^2(150)}{20^2}$$

$$n \geq 5.76$$

$$\boxed{n \geq 6 \text{ metingen}}$$

(d) 95% interval voor μ

$s^2 = 154$ $\quad s = 12.410$

$n = 4$ $\quad \bar{x} = 604$

$$604 - \frac{12.410(3.182)}{\sqrt{4}} < \mu < 604 + \frac{12.410(3.182)}{\sqrt{4}}$$

$$\boxed{584.256 < \mu < 623.744}$$

100 (e) 90% 2-zijdig voor σ^2

$$\frac{3(154)}{7.815} < \sigma^2 < \frac{3(154)}{0.352}$$

$$\boxed{59.117 < \sigma^2 < 1312.5}$$

100 (f) 99% linkseenzijdig voor σ

$$\sigma^2 > \frac{3(154)}{11.345}$$

$$\sigma^2 > 40.723$$

$$\boxed{\sigma > 6.38}$$

100 (g) $\Delta = 40$ $\quad t_3(0.005) = 5.841$

$$n \geq \frac{4(154)(5.841)^2}{40^2}$$

$$n \geq 13.14$$

$n \geq 14$ waarnemingen

Er waren al 4, dus nog $14 - 4 = 10$ extra.