

Opgaver lektion 7

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9.5 Placemaker modul med $\sigma = 0.0015$ approx. normalfordelt
Sample på $n = 75$ med $\bar{x} = 0.310$ inch

95% konfidensinterval på μ : σ kendt

$$\bar{x} - z_{0.025} \frac{\sigma}{\sqrt{n}} < \mu < \bar{x} + z_{0.025} \frac{\sigma}{\sqrt{n}} \quad (1-\alpha)\% = 95\% \Rightarrow \alpha = 5\%$$

$$\Downarrow \quad 2_{0.025} = 1.96$$

$$\Downarrow \quad 0.310 - 1.96 \frac{0.0015}{\sqrt{75}} < \mu < 0.310 + 1.96 \frac{0.0015}{\sqrt{75}}$$

$$\underline{0.3097 < \mu < 0.3103} \quad \checkmark$$

9.7 $n = 100$ bil ejere $\bar{x} = 23.500$ km i gennemsnit om året
med $\sigma = 3900$ km

a) 99% konfidens interval: σ kendt

$$\bar{x} - z_{0.005} \frac{\sigma}{\sqrt{n}} < \mu < \bar{x} + z_{0.005} \frac{\sigma}{\sqrt{n}} \quad (1-\alpha)\% = 99\% \alpha = 1\%$$

$$\Downarrow \quad 2_{0.005} = 2.575$$

$$\Downarrow \quad 23.500 - 2.575 \frac{3900}{10} < \mu < 23.500 + 2.575 \frac{3900}{10}$$

$$\underline{22.496 < \mu < 24.504} \quad \checkmark$$

b) ved at bruge $\bar{x} = 23.500$ km som gennemsnitlig årlig
km i Virginia er vi 99% konfidente, at fejlen ikke
er større end $z_{0.005} \cdot \frac{\sigma}{\sqrt{n}} = \underline{1004 \text{ km}} \quad \checkmark$

9.13 diameter af cylinder stikprøve: 1.01, 0.97, 1.03, 1.04, 0.99, 0.98, 0.99, 1.01,
altså $n = 9$, $\bar{x} = 1.00556$ og $s = 0.0245$ approx normal

99% konfidens interval for μ : σ ukendt

$$\bar{x} - t_{0.005} \frac{s}{\sqrt{n}} < \mu < \bar{x} + t_{0.005} \frac{s}{\sqrt{n}} \quad \text{NB!! } n-1 = 8$$

$$\Downarrow \quad t_{0.005}(8) = 3.355$$

$$1.00556 - 3.355 \frac{0.0245}{3} < \mu < 1.00556 + 3.355 \frac{0.0245}{3}$$

$$\underline{0.978 < \mu < 1.033} \quad \checkmark$$

Opgaver lektion 7

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9.15

$n=12$ $\bar{x}=48.50$ $s=1.5$ normal fordelt

90% konfidens interval for μ : σ ukendt

$$\bar{x} - t_{0.05} \frac{s}{\sqrt{n}} < \mu < \bar{x} + t_{0.05} \frac{s}{\sqrt{n}} \quad t_{0.05}(11) = 1.796$$

$$\Downarrow$$

$$\Downarrow \quad 48.50 - 1.796 \frac{1.5}{\sqrt{12}} < \mu < 48.50 + 1.796 \frac{1.5}{\sqrt{12}}$$

$$\Downarrow \quad \underline{47.722 < \mu < 49.278} \quad \checkmark$$

9.71

\bar{X} : gennemsnitlig værdi \bar{X} approx. normalfordelt med

$\mu = 3$ år og $\sigma^2 = 1$ år

Stikprøve: 1.9, 2.4, 3.0, 3.5, 4.2 $\Rightarrow \bar{x} = 3$ og $s^2 = 0.815$

95% Konfidensinterval for σ^2 :

$$\frac{(n-1)s^2}{\chi^2_{0.025}} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_{0.975}}$$

$$\Downarrow$$

$$\Downarrow \quad \frac{4 \cdot 0.815}{11.143} < \sigma^2 < \frac{4 \cdot 0.815}{0.484}$$

$$\Downarrow \quad \underline{0.29256 < \sigma^2 < 6.73554} \quad \checkmark$$

$1-\alpha = 95\% \Leftrightarrow \alpha = 5\%$
 $\chi^2_{0.025}(4) = 11.143 \checkmark$
 $\chi^2_{0.975}(4) = 0.484 \checkmark$
 aus påstand $\sigma^2 = 1$ er OK.

9.72

$n=20$ studenter grader $\bar{x}=72$ og $s^2=16$ point i test.

Antag antal points normalfordelt.

98% Konfidensinterval for σ^2 :

$$\frac{(n-1)s^2}{\chi^2_{0.01}} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_{0.99}}$$

$$\Downarrow$$

$$\Downarrow \quad \frac{19 \cdot 16}{36.191} < \sigma^2 < \frac{19 \cdot 16}{7.633}$$

$$\Downarrow \quad \underline{8.39988 < \sigma^2 < 39.8271}$$

$1-\alpha = 98\% \Leftrightarrow \alpha = 2\%$
 $\chi^2_{0.01}(19) = 36.191$
 $\chi^2_{0.99}(19) = 7.633$