Øving 12

5.3.1

$\mu = 100$

$\sigma = 15$

$n = 50$

$\bar{y} = 107.9$

$1 - \alpha = 0.95$

$\frac{\alpha}{2} = 0.025$

$z_{\frac{\alpha}{2}} = z_{0.025}$

$= 1.96$

$E = z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}$

$= 1.96 \cdot \frac{15}{\sqrt{50}}$

$\simeq 4.1578$

$\bar{y} + E = 107.9 + 4.1578$

$\simeq 112.0578$

$\bar{y} - E = 107.9 - 4.1578$

$\simeq 103.7422$

$\underline{\underline{I = (103.7422, 112.0578)}}$

5.3.8

5.3.14 $(0.57, 0.63)$

$c = 0.5$

$\frac{k}{n} = \frac{0.57 + 0.63}{2}$

$\underline{\underline{= 0.6}}$

$1 - \alpha = 0.5$

$\frac{\alpha}{2} = 0.25$

$z_{0.25} \approx 0.67$

$E = z_{0.25} \cdot \sqrt{\frac{\frac{k}{n}(1 - \frac{k}{n})}{n}}$

$= 0.67 \cdot \sqrt{\frac{0.6(1 - 0.6)}{n}}$

$= 0.67 \cdot \sqrt{\frac{0.24}{n}}$

$= \frac{0.63 - 0.57}{2}$

$=0.03$

$0.67\sqrt{\frac{0.24}{n}}=0.03$

$n=\frac{0.67^2\cdot 0.24}{0.03^2}$

$\simeq 120$

5.4.14 $f_Y(y;\theta)=\frac{1}{\theta}e^{-\frac{y}{\theta}},\ y>0$

$\hat{\theta}=n\cdot Y_{min}$

$\hat{\theta}$ er "unbiased" hvis $E[\hat{\theta}]=\theta\ \forall\theta$

5.4.20 $p_X(k;\lambda)=\frac{\lambda^k e^{-\lambda}}{k!}$

$\hat{\lambda}_1=X_1$

$\hat{\lambda}_2=\bar{X}$

$E[\hat{\lambda}_1]=E[\hat{\lambda}_2]=\lambda$

$Var[\hat{\lambda}_1]=Var[X_1]$

$=\lambda$

$Var[\hat{\lambda}_2]=Var[\bar{X}]$

$=\frac{\lambda}{n}$

$\frac{Var[\hat{\lambda}_2]}{Var[\hat{\lambda}_1]}=\frac{\frac{\lambda}{n}}{\lambda}$

$=\frac{1}{n}$

5.4.22

Eksamen V2013

2. $n=20$

$P(X=k)=p$

(a) X er binomisk fordelt fordi det er n uavhengige forsøk med to utfall for hvert forsøk

$p=0.4$

$P(X>6)=1-P(X\leq 6)$

$=1-\sum_{k=0}^{6}\binom{20}{k}\cdot 0.4^k\cdot 0.6^{20-k}$

$=1-0.25$

$=0.75$

$\frac{4}{10}\cdot 0.75=0.3$

(b) $P(X\geq 4\mid X=1)=\frac{P(X\geq 4\cap X=1)}{P(X=1)}$

10 0,7 5-0,5

(b) $P(X \geq 4 \mid X = 1) = \frac{P(X \geq 4 \cap X = 1)}{P(X = 1)}$

$= \frac{P(X \geq 4) \cdot P(X = 1)}{P(X = 1)}$

$= P(X \geq 4)$

$P(X \geq 4) = 1 - P(X \leq 3)$

$= 1 - \sum_{k=0}^{20} \binom{20}{k} \cdot 0{,}4^{k} \cdot 0{,}6^{20-k}$

$= 1 - 0{,}016$

$= 0{,}984$

$\underline{\underline{P(X \geq 4 \mid X = 1) = 0{,}984}}$

$r = 5$

$w = 15$

$n = 5$

$k = 2$

$P(2$ defekte aus $5) = \frac{\binom{5}{2}\binom{15}{3}}{\binom{20}{5}}$

$\underline{\underline{= 0{,}3}}$

(c) $L(p) = \prod_{i=1}^{n} p^{W_i}(1-p)^{1-W_i}$

$= p^{\sum_{i=1}^{n} W_i}(1-p)^{\sum_{i=1}^{n}(1-W_i)}$

$= p^{W}(1-p)^{n-W}$

(d) $E[\hat{p}] = \frac{\sum_{i=1}^{5} E[W_i]}{80}$

$=$