Practice Problems

12 - Nov - 09

3.5

5. $f(X, \theta) = e^{\theta - X}$

$L(\theta) = e^{\theta - X_1} \cdot e^{\theta - X_2} \cdot \ldots \cdot e^{\theta - X_n}$

To maximize L, we want to maximize θ due to the exponents. However, since $\theta < X_*$, it can at largest be equal to the smallest value of X.

$\theta = \min(X_1, X_2, \ldots, X_n)$

7 $\mu = \bar{X}$

$\sigma^2 = \frac{\bar{X}^2}{n}$

$\sigma = \frac{X}{\sqrt{n}}$

95% confidence interval $= \mu \pm 2\sigma$

$= \left[\bar{X} - \frac{\bar{X}}{\sqrt{n}}, \bar{X} + \frac{\bar{X}}{\sqrt{n}} \right]$

3.6

11. $E(\bar{X}) = E(X) = 30$

$\sigma(\bar{x}) = \frac{\sigma(X)}{\sqrt{n}} = 0.3$

$P\left(Z \geq \frac{29.5 - 30}{0.3}\right)$

$= P(Z \geq 1.67)$

$= \boxed{0.9522}$

13. Using CLT:

p 122

$E(\bar{x}) = E(x) = \alpha \cdot \theta = 8$

$Var(\bar{x}) = \frac{Var(x)}{n} = \frac{\alpha \cdot \theta^2}{n} = 4$

$P(Y \leq 35) = P(\bar{x} \leq 8.75)$

$= P\left(Z \leq \frac{8.75 - 8}{2}\right)$

$= 0.6462$

Using gamma, $\alpha = 4 \cdot 4 = 16$

$\theta = 2$

Using an online calculator,

$P = 0.6725$