

STAT310  
Practice Problems  
Week 10

May 1, 2012

## 1 Confidence intervals

We can standardize to a standard normal

$$\frac{\hat{\lambda} - E[\hat{\lambda}]}{SD(\hat{\lambda})} \sim z$$

so, substituting  $E[\hat{\lambda}] = \lambda$ ,

$$\frac{\hat{\lambda} - \lambda}{\sqrt{\hat{\lambda}}/\sqrt{n}} \sim z.$$

If we use the estimator  $\frac{\sqrt{\hat{\lambda}}}{\sqrt{n}}$  for  $\frac{\sqrt{\lambda}}{\sqrt{n}}$ , we have

$$\begin{aligned} P(-z_{\alpha/2} < \frac{\hat{\lambda} - \lambda}{\sqrt{\hat{\lambda}}/\sqrt{n}} < z_{\alpha/2}) &= 1 - \alpha \\ \implies P(-z_{\alpha/2} \frac{\hat{\lambda}}{\sqrt{n}} + \hat{\lambda} < \frac{\hat{\lambda} - \lambda}{\sqrt{\hat{\lambda}}/\sqrt{n}} < z_{\alpha/2} \frac{\hat{\lambda}}{\sqrt{n}} + \hat{\lambda}) &= 1 - \alpha \end{aligned}$$