**In-Class Activity: Simulation**

You can use simulation studies to verify or test theoretical results from your probability theory course.

In this case, we are investigating the normal approximation for the poisson distribution. Recall that although the Poisson distribution is a discrete distribution, it can be approximated by the Normal distribution under certain circumstances (when λ is large). But, how large does lambda need to be? How does sample size affect the approximation?

Run a simulation study to identify what combinations of lambda and n are sufficient to provide an acceptable normal approximation. Test the following λ values: 10, 50, & 100 and the following sample sizes: 10 & 100.

Example plot:

Poisson vs. Normal with lambda=10 & n=10
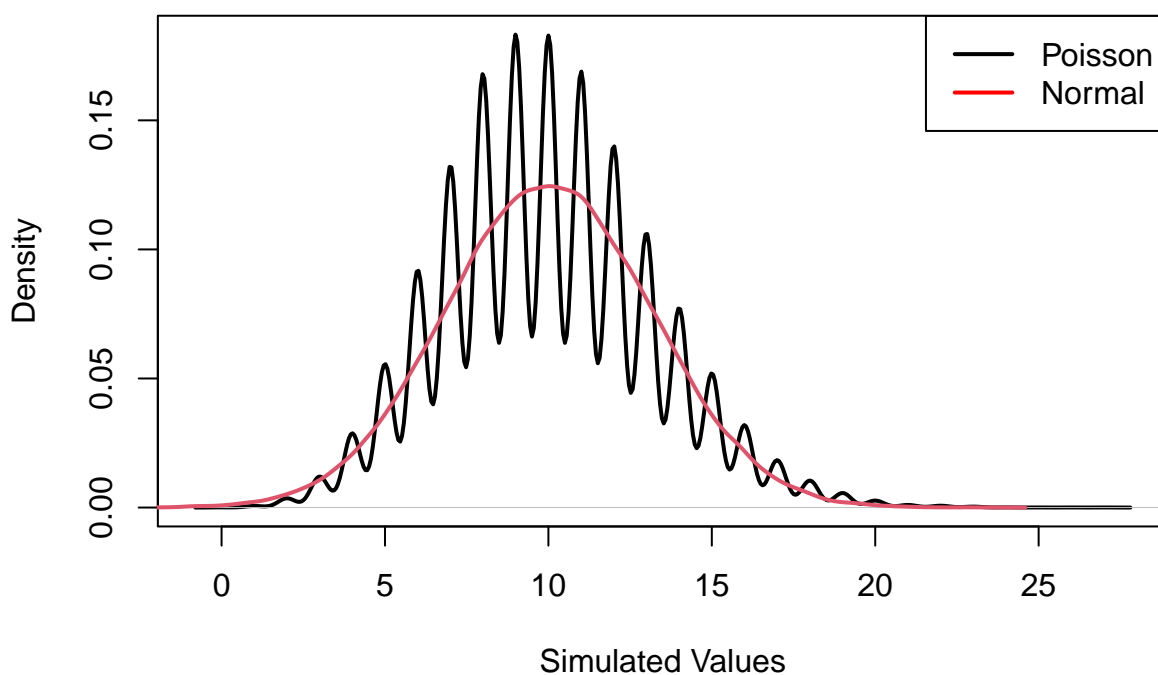
Code for plotting (using base R plotting)

The object "sp" is the vector of values simulated from the Poisson distribution. The object "sn" is the vector of values simulated from the Normal distribution.

```
#plot
plot(density(sp),type='l',lwd=2,
     main=paste('Poisson vs. Normal with lambda=', lambda, " & n=", n, sep=""),
     xlab='Simulated Values',
     ylab='Density')
lines(density(sn),type='l',lwd=2,col=2)
legend('topright',c('Poisson','Normal'),
       col=c('black','red'),lwd=2)
```