POL211 TA Session 3

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```
setwd(dirname(rstudioapi::getActiveDocumentContext()$path))
rm(list = ls()) # Remove all objects from workspace.
```

Revisit Hotel Vacancy problem

Calculate the answer to the proability that at least all hotels have one person

```
# Adding Hotel E

test <- list(NA)
index <- list(NA)
i <- 1

for(na in 1:11){
  for(nb in 1:(12-na)){
    for(nc in 1:(13-na-nb)){
      for(nd in 1:(14-na-nb-nc)){
        test[i] <- 1/16 * 1/(16 - na) * 1/(16-na-nb) * 1/(16-na-nb-nc)
        index[i] <- i
        i <- i + 1
      }
    }
  }
}

# 1001 combinations of na, nb, nc, & nd
length(test)
```

```
## [1] 1001
```

```
# Pr of at least one tourist staying in Hotel E
sum(as.numeric(test))
```

```
## [1] 0.1018254
```

Distribution Functions

Binomial Distribution

```
?rbinom

# Random Draws from the distribution
rbinom(10, size = 1000, prob = c(0.9))
```

```
##  [1] 902 901 896 899 896 894 902 894 893 899
```

```r
# Pr of specific values in the distribution
dbinom(900, size = 1000, prob = c(0.9))
```

```
## [1] 0.04201679
```

```r
# Cummulative Probability of values
pbinom(900, size = 1000, prob = c(0.9))
```

```
## [1] 0.5154177
```

```r
sum(dbinom(0:900, size = 1000, prob = c(0.9)))
```

```
## [1] 0.5154177
```

```r
# The value that satisfies the specific cummulative probabilities
qbinom(0.5154177, size = 1000, prob = c(0.9))
```

```
## [1] 900
```

Bernoui Distribution?

```r
rbinom(10, size = 1, prob=0.5)
```

```
##  [1] 1 0 0 1 1 1 0 0 0 1
```

Poisson Distribution

```r
?rpois

rpois(10, 414)
```

```
##  [1] 407 443 396 376 400 416 441 441 428 422
```

```r
dpois(400, 414)
```

```
## [1] 0.01569664
```

```r
ppois(400, 414)
```

```
## [1] 0.2549781
```

```r
qpois(0.8, 414)
```

```
## [1] 431
```

Continuous Uniform

```r
?runif

runif(10, min=10, max=20)
```

```
##  [1] 19.62430 17.50290 14.58540 11.18090 19.17854 12.43526 19.66089
##  [8] 18.05482 13.58232 14.13386
```

```r
dunif(15, min=10, max=20)
```

```
## [1] 0.1
```

```r
punif(17, min=10, max=20)
```

```
## [1] 0.7
```

```r
qunif(0.8, min=10, max=20)
```

```
## [1] 18
```

Negative Binomial

```r
?rnbinom

rnbinom(10, size=1000, prob=0.8)
```

```
##  [1] 253 245 251 256 242 256 228 251 278 256
```

```r
dnbinom(200, size=1000, prob=0.8)
```

```
## [1] 0.0003296854
```

```r
pnbinom(250, size=1000, prob=0.8)
```

```
## [1] 0.5169171
```

```r
qnbinom(0.8, size=1000, prob=0.8)
```

```
## [1] 265
```