Assignment 10 - 23Nov18

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Assignment 10 - Lab

1. Write a function that calculates cumulative distribution function of a binomial random variable.

Compare results from your function with pbinom() function.

```
p_binom <- function(x,size, probz) {
    total = sum(dbinom(0:x,size, probz))
  return(total)
}


p_binom(60, 100, 0.5)
```

```
## [1] 0.9823999
```

```
pbinom(60,100,0.5)
```

```
## [1] 0.9823999
```

```
library(microbenchmark)
microbenchmark(p_binom(60, 100, 0.5),pbinom(60,100,0.5))
```

```
## Unit: microseconds
##                   expr    min      lq     mean  median      uq    max
##  p_binom(60, 100, 0.5) 13.229 13.4600 14.29225 13.5895 13.9300 34.635
##    pbinom(60, 100, 0.5)  1.462  1.7045  2.76084  1.9040  2.0935 37.279
##  neval
##    100
##    100
```

2. Write a function that runs simulations to obtain power from a one-sample t-test. Run your function (with number of simulations = 10,000) with n = 30, delta = 0.5, sd = 1 and sig.level = 0.05. Compare your results with power.t.test(n = 30, delta = 0.5, sd = 1, sig.level = 0.05, type = 'one.sample').

```
#Create Function
power_sim <- function(reps, n, mu0, delta, sigma, alpha) {
power <- replicate(reps,
                   {
x <- rnorm(n, mean = delta, sd = sigma)
tt <- as.numeric(t.test(x)$p.value < alpha)

}
)
return(sum(power)/length(power))
}


power_sim(10000, 30, 0, 0.5, 1, 0.05)
```

```
## [1] 0.7549
```

```r
#Power.T.Test
power.t.test(n = 30, delta = 0.5, sd = 1, sig.level = 0.05, type = "one.sample")
```

```
## 
##      One-sample t test power calculation
## 
##              n = 30
##          delta = 0.5
##             sd = 1
##      sig.level = 0.05
##          power = 0.7539627
##    alternative = two.sided
```

```r
microbenchmark(power_sim(10000, 30, 0, 0.5, 1, 0.05),power.t.test(n = 30, delta = 0.5, sd = 1, sig.level
```

```
## Unit: microseconds
##                                                                     expr
##                                    power_sim(10000, 30, 0, 0.5, 1, 0.05)
##  power.t.test(n = 30, delta = 0.5, sd = 1, sig.level = 0.05, type = "one.sample")
##          min            lq         mean        median           uq
##   1203550.814 1259147.2970 1315073.6765 1318824.8360 1363771.254
##        92.871      109.8695     161.7747      156.3775      175.078
##          max neval
##   1549143.205    100
##       548.833    100
```