STT810 ICA4

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## Question 1

### a

cdf(x = 1) = 0.3 (probability x ≤ 1) cdf(x = 2) = 0.5 (probability x ≤ 2) cdf(x = 3) = 0.65 (probability x ≤ 3) cdf(x = 4) = 1 (probability x ≤ 4)

### b

4\*4 = 16 total outcome

the possible outcome 4 has combination 1+3, 2+2, 2+2 and 3+1

So it’s “0.3*0.15*2 + 0.2\*0.2” = 0.13

We can also test with R function.

lis <- (sample(c(1:4),10000,prob = c(0.3,0.2,0.15,0.35),replace = T) + sample(c(1:4),10000,prob = c(0.3,0.2,0.15,0.35),replace = T))  
  
sum(lis == 4)/10000

## [1] 0.1325

We can see it’s similiar.

## Question 2

### a

dbinom(6,12,0.5)

## [1] 0.2255859

We can see it’s 0.22556.

pbinom(3,12,0.5)

## [1] 0.07299805

We can see the probability for the coin is heads 3 times or less is 0.073.

### c

sample(c(0,1),12,replace = T)

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

## Question 3

### a

1-pbinom(1,6,0.2)

## [1] 0.34464

The probability is 0.345.

### b

dbinom(0, 6, 0.2)

## [1] 0.262144

The probability of winning 0 times out of 6 is 0.262.

### c

xx = replicate(10000,sample(c(1:5),6,replace = T))  
  
  
tes <- 0  
for (i in 1:10000){  
 if ((sum(xx[,i]==1) == 0)){  
 tes <- tes + 1  
 }  
}  
tes/10000

## [1] 0.2613

We can see that the results are simular.