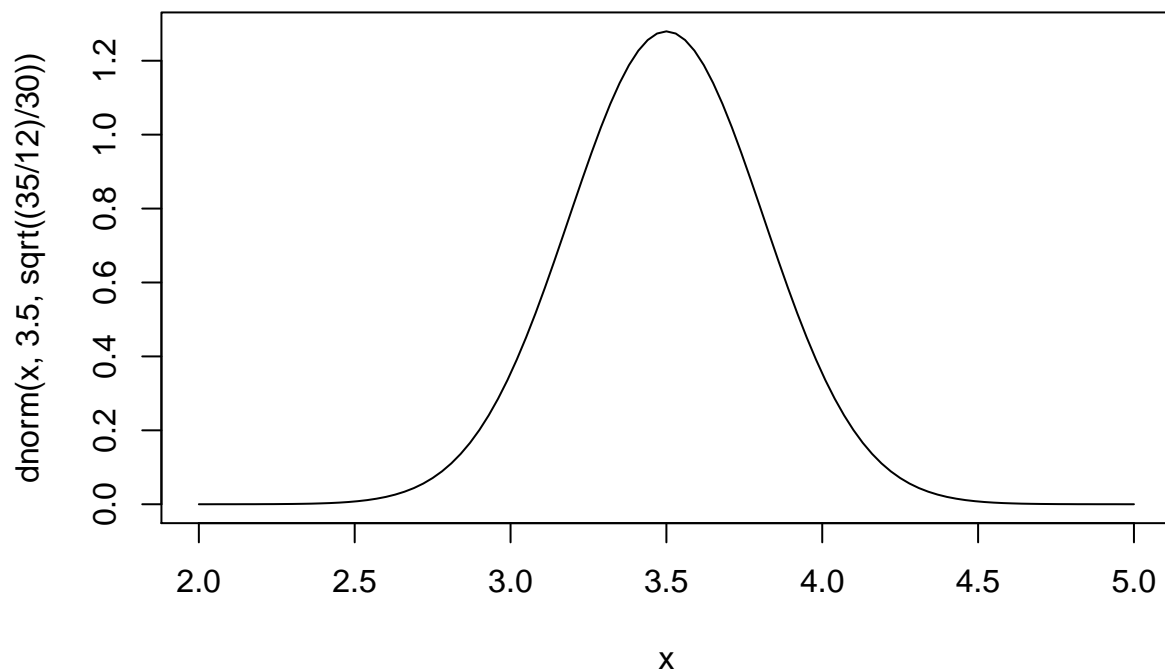


# STAT204 Homework-3

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```
#####  
#* Homework 3  
#* Stat 204  
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#####  
  
##Q1:  
  
#A-)  
#* The results from the dice rolls create a uniform distribution as all numbers have  
#* an equal chance of occuring. But as there are only integers on dice its discrete  
#* uniform on  $[1,6]$ . We know that the mean is equal to  $(a+b)/2 = 7/2 = 3.5$   
#* and var is  $n^2-1/12 = 36-1/12 = 35/12$  for every throw.  
#* From CLT we apply formula to  $\bar{x} \Rightarrow (\bar{X}-\mu)/(\sqrt{\sigma^2/n}) \sim N(0,1)$   
#* From this formula we find  $\bar{X}-3.5/\sqrt{(35/12)/30} \sim N(0,1)$   
  
curve(dnorm(x,3.5,sqrt((35/12)/30)), from = 2, to = 5)
```



```
#We selected (2,5) as xlimits, because we thought its the most suitable period  
#to see all of the curve.
```

```
#B-)  
tries_means <- vector()  
for(i in 1:10000){  
  tries_means <- append(tries_means, mean(sample(1:6, 30, replace = T)))  
}  
mean(tries_means) #very close to 3.5
```

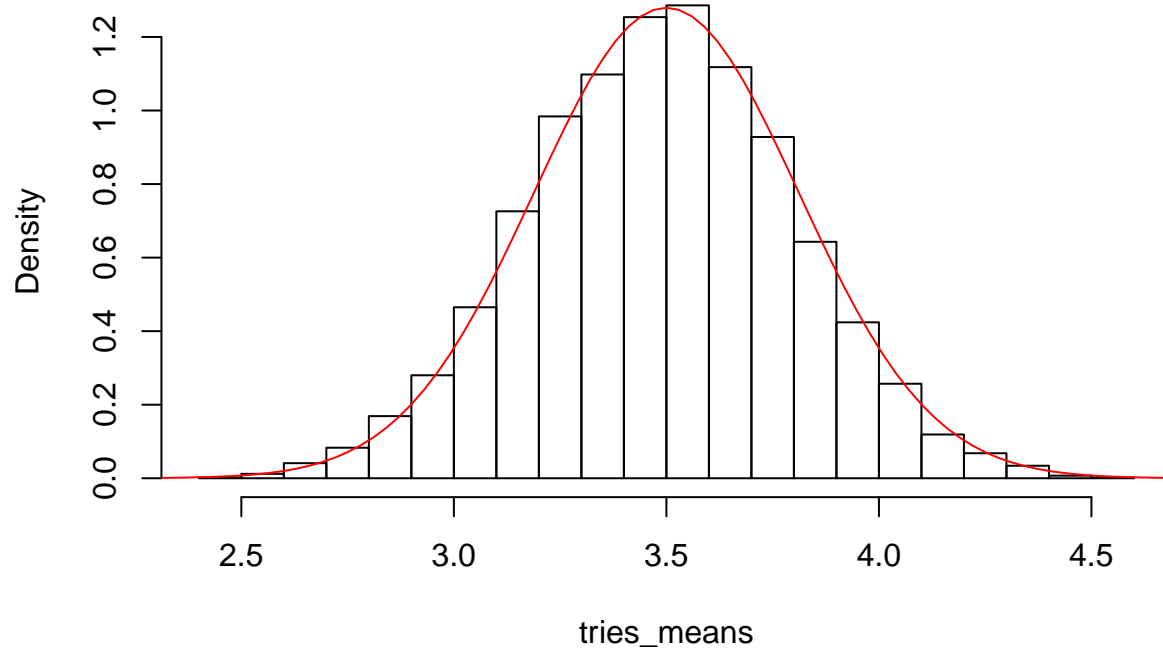
```
## [1] 3.503947
```

```
sd(tries_means) #very close to 0.311 which is sqrt((35/12)/30)
```

```
## [1] 0.3096231
```

```
#C-)  
hist(tries_means, probability = T)  
curve(dnorm(x,3.5,sqrt((35/12)/30)), from = 2, to = 5, add = T, col="Red")
```

## Histogram of tries\_means



```
##Q2:
```

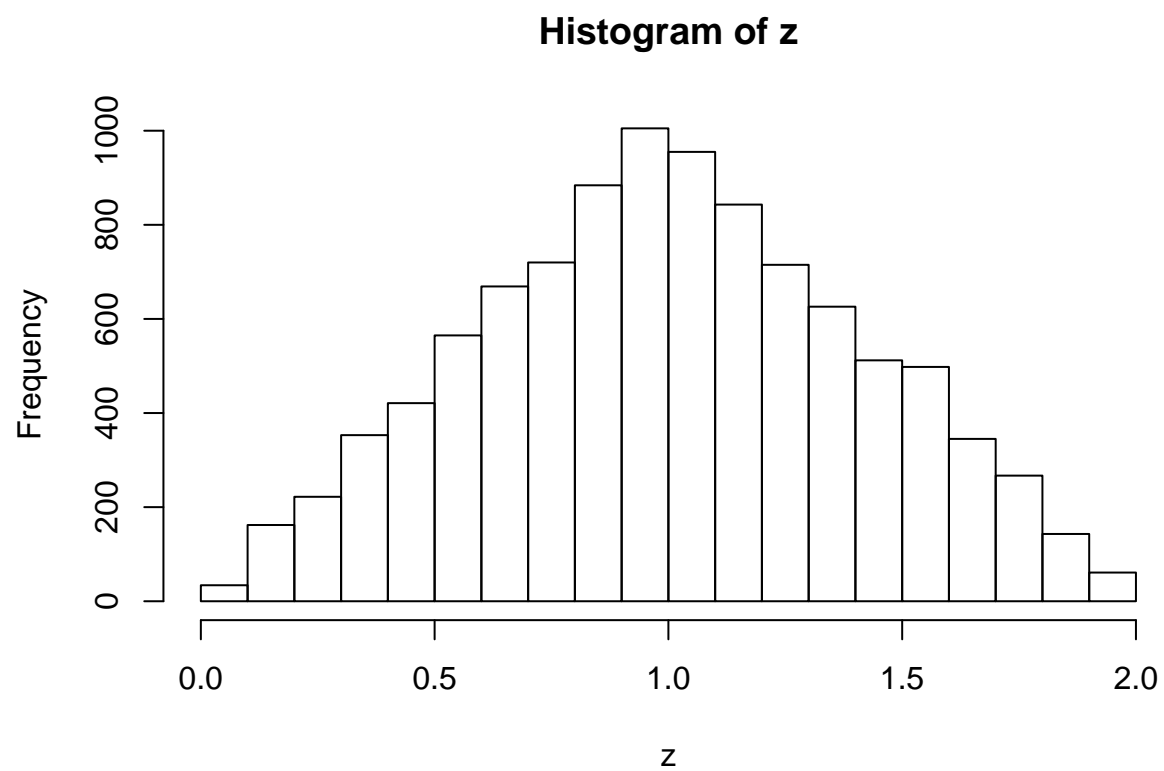
```
#A-)
```

```
#Its 0, its because both x,y can take values up to 1. So the max value of x+y is 2  
#The question asks the probability  $P(x+y>2)$  so the answer is 0.
```

```
x <- runif(10000)  
y <- runif(10000)  
z <- x+y  
plusthres <- sum(z > 2)  
propthres <- plusthres/length(z) #The proportion of values above 2 to all.  
propthres #Is 0
```

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

```
hist(z) #No values are above 2
```



```
#B-)  
# x and y is already here  
plusthresb <- sum(z>5*x*sqrt(y))  
propthresb <- plusthresb/length(z)  
propthresb
```

```
## [1] 0.2432
```