PSTAT 10 Worksheet 5

Sou Hamura

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Step 1.

```
roll <- function(nroll){
  result <- sample.int(6, nroll, replace=TRUE)
  t <- table(result)
  low <- t["1"] + t["2"] + t["3"]
  high <- t["4"] + t["5"] + t["6"]
  odd <- t["1"] + t["3"] + t["5"]
  even <- t["2"] + t["4"] + t["6"]
  if (low > high & odd > even){
    return(TRUE)
  } else{
    return(FALSE)
  }
}

roll(10000)
```

```
## [1] TRUE
```

Step 2.

```
replicates <- vector(length=500)
for (i in 1:500){
  replicates[i] <- roll(10000)
}
```

Step 3.

```
n_result <- table(replicates)
probability <- n_result["TRUE"] / 500
probability
```

```
##  TRUE
## 0.282
```

the estimated answer to the dice problems is 0.3 (= 30%)

it was a lot more easy to get the answer than leanring the mutivariate limit theorem because I was able to excute the calculation onlyl by using easy calculations and coding without knowoing what it even

Step 4.

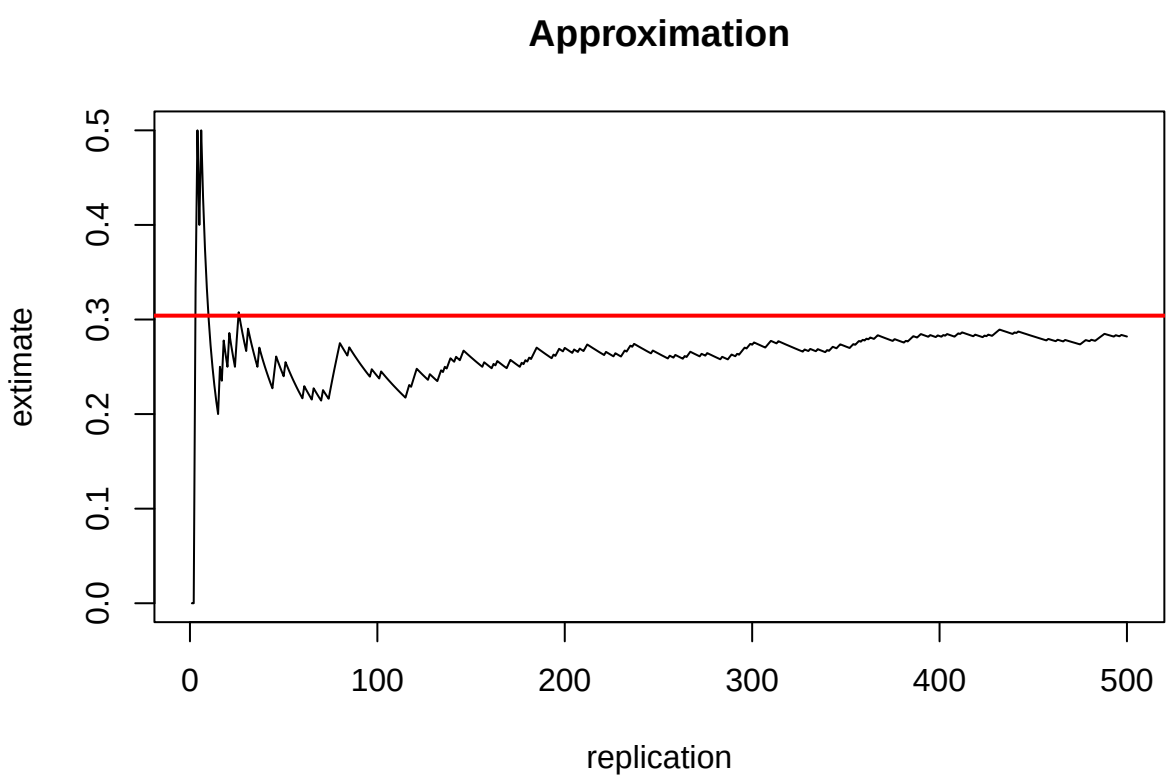
```
running_mean <- function(m){
  for (i in 1:m){
    vec <- cumsum(replicates)
    vec2 <- vec[i] * (1/i)
  }
  return(vec2)
}

running <- sapply(1:500, running_mean)


p <- ((1/4) + (asin(1/3)/(2*pi)))

plot(running,
     type = "l",
     xlab = "replication", ylab = "extimate",
     main = "Approximation",
     ylim = c(0, 0.5)
     )

abline(h = p, col = "red", lwd = 2)
```


Approximation
extimate
0.0
0.1
0.2
0.3
0.4
0.5
0
100
200
300
400
500
replication