ECO 420Y — Homework 1

Joe White

2025-09-21

Question 1

```r
#========================== Question 1 =====================================
## Pay 2 dollars to roll three dice. The casino pays 5 if sum=10, else pays 1.

set.seed(123)

i = 1
return = rep(-1,100000)

while (i <= 100000) {
  die1 = sample(1:6,1)
  die2 = sample(1:6,1)
  die3 = sample(1:6,1)
  if ((die1+die2+die3)==10) return[i] = 3
  i = i+1
}

print(mean(return))
```

```
## [1] -0.4954
```

```r
print(var(return))
```

```
## [1] 1.763796
```

Question 2

```r
#========================== Question 2 =====================================
## Simulate 95% CI for 5-year buy-hold-sell returns on SP500

library(tseries)
library(quantmod)

symbols = c("SP500")
getSymbols(symbols, src="FRED")
```

```
## [1] "SP500"
```

```
sp = coredata(SP500)
n = nrow(sp)
j = 1
ra_sp = NULL

while (j + 252*5 <= n) {
  ra_sp = c(ra_sp, (sp[j+252*5] - sp[j]) / sp[j])
  j = j + 1
}

quantile(ra_sp, probs = c(0.025,0.975), na.rm=TRUE)
```

```
##      2.5%     97.5%
## 0.4032606 1.1314197
```

Histogram

```
hist(ra_sp, breaks = 50,
     main = "Distribution of 5-year SP500 Returns",
     xlab = "5-year return")
```


Distribution of 5−year SP500 Returns