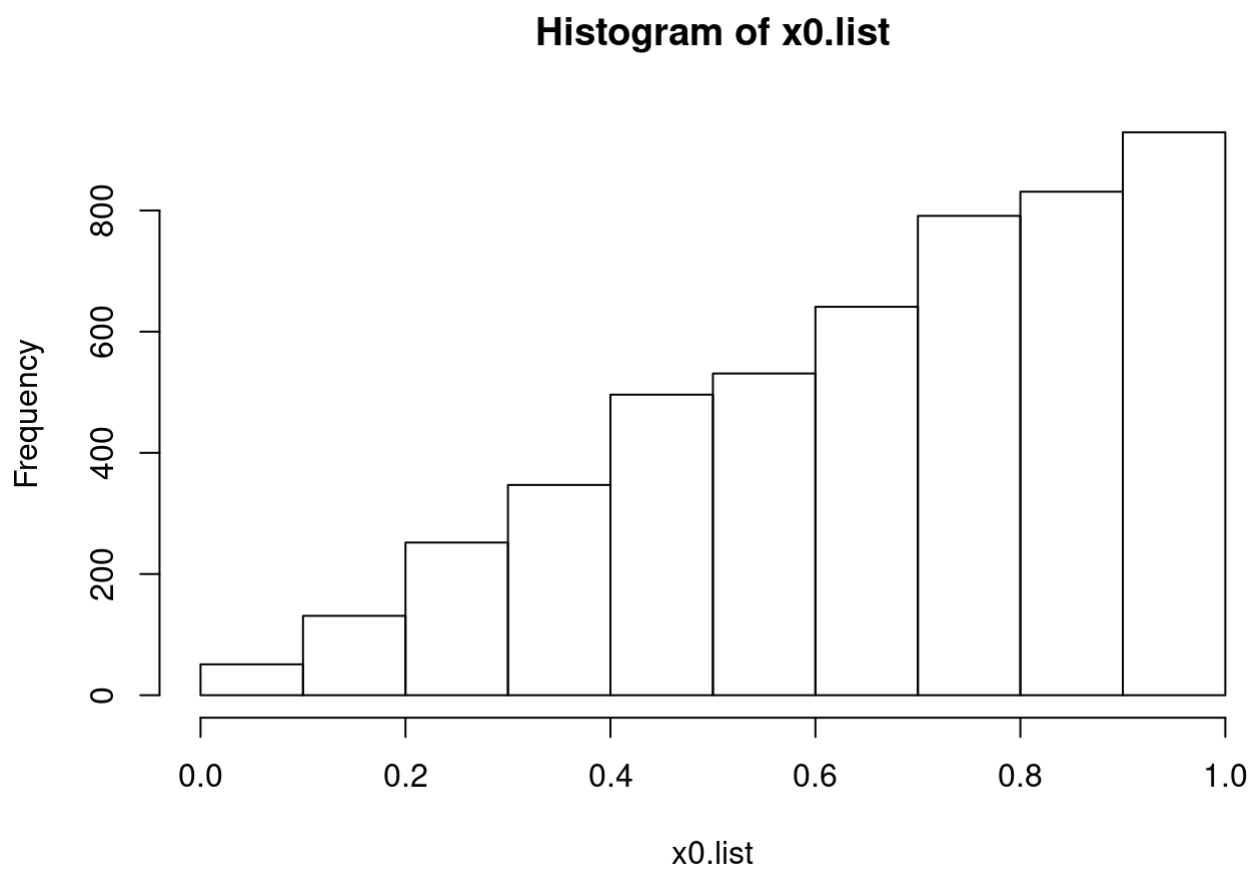
title: “hw1cp” output: pdf_document —

q(1c)

```
set.seed(3301)
u=runif(n=1)
x0.list= sqrt(runif(n=5000))
hist(x0.list)
```




```
ex_0 = mean(x0.list)
var_0 = var(x0.list)
ex_0
```

```
## [1] 0.6655847
```

```
var_0
```

```
## [1] 0.05472131
```

question 2(b)

```
set.seed(3301)
n=10
reps = 1e4
bern.list = numeric(10)
binom.list = numeric(1e4)
for (i in 1:reps){
  bern.list = 1*(runif(n=10)< .6)#calculated the realization of W1, ... , W10 that are iid Bern(.6)
  binom.list[i] = sum(bern.list) # sum of the realization of W1, ..., W10 that are iid Bern(.6) is the Binom(w;1
0,.6) where w = number of individuals that use google web browser out of n = 10 and the probability is 0.6
}
# Z ~ Binom(10,.6)

expec_binom = mean(binom.list) # E(Z)
expec_binom
```

```
## [1] 5.9636
```

```
var_binom = var(binom.list)# Var(Z)
var_binom
```

```
## [1] 2.361711
```

question 2(e)

```
set.seed(3301)
reps = 1e4
binom2.list = numeric(1e4)
mean2.list = numeric(1e4)
for(i in 1:reps){
  bernk.list = 1*(runif(n=10) <.6)# computes the realization of 10 iid bernoulli radom variable
  binom2.list[i] = sum(bernk.list) # stores list of 10000 reps realization of w1+..+wn iid Binom(n=1e4, θ = .6 )
  mean2.list[i] = binom2.list[i]/10 # stores list of 10000 reps realizations of mean of W or (Wbar)
}
expec_of_mean = mean(mean2.list) # expectation of the 10000 reps realization of mean of W(Wbar) or E(Wbar)
expec_of_mean
```

```
## [1] 0.59636
```

```
var_of_mean = var(mean2.list) # variance of the list of 10000 reps realizations of mean of W
var_of_mean
```

```
## [1] 0.02361711
```

question 2(f)

```
set.seed(3301)

reps =1e4
n2.list = numeric(1e4)
s= numeric(5)
s <- c(35,40,55,100,200) # each sample size in the vector is accesed via s[j] loop iteration
prob.list = numeric(5)
count =0
j =1
binom3.list = numeric(10000)
binom4.list = numeric(10000)

for(j in 1:5){# iteration for the various sample size
  for(k in 1:reps ){
    bern3.list = 1*(runif(n=s[j])<.6) # realizations of w1,..., wn
    binom3.list[k] = sum(bern3.list)/s[j] + 1/sqrt(s[j]) # realization of wbar + 1/sqrt(s[i]) stored where i iter
ates from 1 to 5
    binom4.list[k] = sum(bern3.list)/s[j] - 1/sqrt(s[j]) # realization of wbar - 1/sqrt(s[i]) where i iterates fr
om 1 to 5
  } # end of inner loop1

  for(k in 1:reps){# loop to iterate through the 10000 random interval
    if(binom3.list[k]>= .6 & binom4.list[k]<=.6){ # the condition checks if theta=0.6 exists in this random inter
val
      count = count+1 # count is incremented everytime theta =.6 exists in the interval
    }
   } # end of inner loop2
  prob.list[j] = count/reps  # probability list is created to record the percentage of 10000 rep realizations of
 the random interval with the corresponding sample sizes (35,40,55,100,200)

  count =0 # initializing count back to 0 for new sample size rep realization
}# end of outer loop
prob.list
```

```
## [1] 0.9461 0.9656 0.9605 0.9709 0.9623
```