

April 12, 2023

The results below are generated from an R script.

```
# Question 1
#a.
secant = function(x1,x2,f){
  for(i in 1:3){
    x3 = x2-(f(x2)*(x2-x1)/(f(x2)-f(x1)))
    x2 = x1
    x1 = x3
  }
  return(x3)
}

#b.
f = function(x){
  cos(x)
}
secant(1.56, 1.58, f)

## [1] 1.570796

#c)
f = function(x){
  ((x^3)-(2*x)+3)
}
secant(-2,-1.8, f)

## [1] -1.893291

# Question 2
#a.
WHunif = function(n,x,y,z){
  u = numeric(n)
  for (i in 1:n){
    x = (171*(x-1)) %% 30269
    y = (172*(x-1)) %% 30307
    z = (170*(x-1)) %% 30323
    v = (x/30269) + (y/30307) + (z/30323)
    u[i] = v - floor(v)
  }
  return(u)
}

#b.
WHunif(20,1,2,3)
```

```

## [1] 0.98871844 0.53552175 0.68532986 0.24807533 0.01678553 0.24223291 0.87052850
## [8] 0.68666066 0.01487628 0.96851896 0.07183138 0.98947080 0.27700946 0.27169936
## [15] 0.21008242 0.03520354 0.20771066 0.04082593 0.73392055 0.87232181

# Question 3
#a.
WHcointoss = function(n, p){
  tosses = WHunif(n, 1, 2, 3)
  results = numeric(n)
  for(i in 1:length(tosses)){
    if(tosses[i] > p){
      results[i] <- 1
    }else{
      results[i] <- 0
    }
  }
  return(results)
}
#b.
WHcointoss(20, 0.5)

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

# Question 4
func = function(x){
  return(log(x)+x)
}
secant(0.5,1,func)

## [1] 0.5671391

# Question 5
#a.
myrandom = function(n,x){
  set.seed(x)
  toReturn = numeric(n)
  for (i in 1:n){
    x = (171*(x-1)) %% 30269
    toReturn[i] = x/30269
  }
  return(toReturn)
}
#b.
myrandom(10,25)

## [1] 0.1355843 0.1792593 0.6476924 0.7497440 0.2005682 0.2915194 0.8441640 0.3463940
## [9] 0.2277247 0.9352803

# Question 6
#a.
myguesses = function(n){
  x = myrandom(n,325)
  toReturn = as.integer(x <= 0.25)
  return(toReturn)
}

```

```

}
#b.
myguesses(20)

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

cat(sum(myguesses(20)), " out of 20 answers were correct")

## 3 out of 20 answers were correct

```

The R session information (including the OS info, R version and all packages used):

```

sessionInfo()

## R version 4.2.2 (2022-10-31)
## Platform: x86_64-apple-darwin17.0 (64-bit)
## Running under: macOS Ventura 13.1
##
## Matrix products: default
## LAPACK: /Library/Frameworks/R.framework/Versions/4.2/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods    base
##
## loaded via a namespace (and not attached):
## [1] compiler_4.2.2 fastmap_1.1.0 cli_3.6.0      htmltools_0.5.4 tools_4.2.2
## [6] tinytex_0.44    rmarkdown_2.20 highr_0.10     knitr_1.42     xfun_0.37
## [11] digest_0.6.31  rlang_1.0.6    evaluate_0.20
##
Sys.time()

## [1] "2023-04-12 12:24:40 PDT"

```