## 情報数理B　第3.4回練習問題

## 廣瀬　慧

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**練習問題3.1**

**解答**

# \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\* \*\*\*

ans = 0

for(i in 1:100){

for(j in 1:100){

for(k in 1:100){

ans <- ans + (i+j+k)/{(i+j) \* (j+k) \* (k +i)}

}

}

}

ans

**練習問題3.2**

**解答**

f <- function(x) {

if(x>= 0 && x < 2){

ans <- exp(x) - 5 \* log(x + 1)

}else if(x >=2 & x <=3){

ans <- {exp(4-x) + (x-2)^(1/2) / 5 - 5 \* log(5 - x)}

}

return(ans)

}

x <-seq(0.0,3.0,0.01)

y <- sapply(x,f)

plot(x,y,type="l")

#グラフが描かれました。

#**グリッドサーチ**

ans<- NULL

dif = 100000

h = 3/dif

for(i in 1:dif){

if(abs(f(i\*h)) < 0.0001){

ans <- c(ans,i\*h)

i = i + h

}

}

ans

#**結果**

0.31542 0.31545 0.31548 1.53858 1.53861 2.51814 2.51817 2.51820　(このうち三つだけが答えになる)

**練習問題3.3**

**解答**

**#(1)**

func1 <- function(n){

a <- rep(0,n)

for(i in 1:n){

rnd <- runif(1)

if(rnd >= 0 && rnd <= 0.4){

a[i] <- 0

}else if(rnd >= 0.4 && rnd <= 1.0){

a[i] <- 1

}

}

return(a)

}

X <- func1(50)

X

#**結果**

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

[37] 1 0 0 1 1 1 1 1 1 0 1 1 1 1

**#(2)**

func2 <- function(n2){

Y <- 0

X <- func1(n2)

for(i in 1:n2){

Y <- Y + X[i]

}

return(Y)

}

**(3)**

Y<-NULL

for(i in 1:100){

Y <- append(Y,func2(50))

}

Y

#**結果**

[1] 32 29 27 32 27 27 31 32 28 32 31 28 28 31 34 33 29 32 35 37 33 26 28 34

[25] 34 28 38 35 28 28 31 30 29 33 33 29 28 23 30 34 34 33 29 31 28 34 35 34

[49] 28 34 25 28 28 30 29 31 28 36 31 30 32 32 33 35 31 24 32 32 29 32 37 32

[73] 31 28 31 26 29 22 30 31 23 24 28 31 28 25 27 25 27 26 32 31 24 32 29 31

[97] 30 22 33 34 36

**練習問題3.4**

**解答**

my.rexp <- function(n,lambda){

X<-NULL

for(i in 1:n)

{

rnd <- runif(1)

tmp <- ((-1 / lambda) \* log(1-rnd))

X <- append(X,tmp)

}

return(X)

}

x <-my.rexp(10000,0.3)

x

#histogram

h <- hist(x,freq=FALSE,breaks = 100)

h

#**density function**

x0 <- seq(min(h$breaks),max(h$breaks),length.out = 1000)

lambda = 0.3

my.dexp <- function(x){

return(lambda\*exp(-lambda \* x))

}

y0 <- sapply(x0,my.dexp)

par(new = T)

plot(x0,y0,xlim=range(h$breaks),ylim=c(0,max(h$density)),type="l",ann=F,axes=F,lwd=2,col="red")

**練習問題3.5**

**解答**

my.rexp <- function(n,lambda){

X<-NULL

for(i in 1:n)

{

rnd <- runif(1)

tmp <- ((-1 / lambda) \* log(1-rnd))

X <- append(X,tmp)

}

return(X)

}

y<-NULL

my.gamma <- function(n,m,lambda){

for(i in 1:n){

x<-my.rexp(m,lambda)

y<-append(y,sum(x))

}

return(y)

}

my.gamma(100,50,0.5)

#結果

[1] 26.45240 27.59641 24.00034 27.79487 24.10985 17.53382 36.15446 29.79680 25.39660 20.62009 27.15985 19.73086 23.19893 27.63968 26.31905 20.96602 27.35020

[18] 23.66126 27.29628 26.82346 31.64193 28.21663 32.34995 33.37409 25.16014 18.87486 20.60722 24.98649 28.66474 16.36698 24.98535 22.64805 24.93278 29.02306

[35] 20.35783 25.18512 33.95553 22.39481 20.49485 22.03044 32.99094 20.06352 27.04503 26.30107 24.81944 29.42119 19.19740 24.10275 30.71038 19.09750 24.61639

[52] 22.30897 29.77631 24.01542 21.18818 27.81139 31.53400 32.91253 27.95316 22.21377 26.91322 27.82006 20.47727 31.35676 24.68042 25.32975 28.26483 23.82561

[69] 28.40600 24.95624 23.50716 29.31211 21.62351 23.37764 24.25091 22.26051 23.38026 28.57590 26.50931 21.77805 23.73172 26.10737 22.64865 19.25343 23.71585

[86] 24.23664 25.54203 23.99614 23.58340 28.98526 26.66067 27.55262 23.88875 27.99133 23.11093 27.31241 25.78219 23.12574 33.87483 21.00658

**練習問題3.6.1**

**解答**

my.rbeta42.1 <-function(n){

x <- NULL

y <- NULL

for(i in 1:n){

u1 <- runif(1)

u2 <- runif(1,0,4)

yf <- 20 \* u1^3 \* (1-u1)

if(u2 <= yf){

x <- append(x,u1)

y <- append(y,u2)

}

}

return(pairlist(x,y))

}

m<-my.rbeta42.1(1000)

h<-hist(m[[1]],freq=FALSE,breaks = 100)

#density function

x0 <- seq(min(h$breaks),max(h$breaks),length.out=1000)

my.rbeta <-function(x) 20\*x^3\*(1-x)

y0 <- sapply(x0,my.rbeta)

par(new = "T")

plot(x0,y0,xlim=range(h$breaks),ylim=c(0,max(h$density)),type="l",ann=F,axes =F,lwd =2,col="red")