hw4

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Prob 4

The code should not be too compact. Between lines or words , I should use more space and enter. And add more notes for understanding what is this part of code for.

Prob 5

I should take proper care of space between operators or symbols.

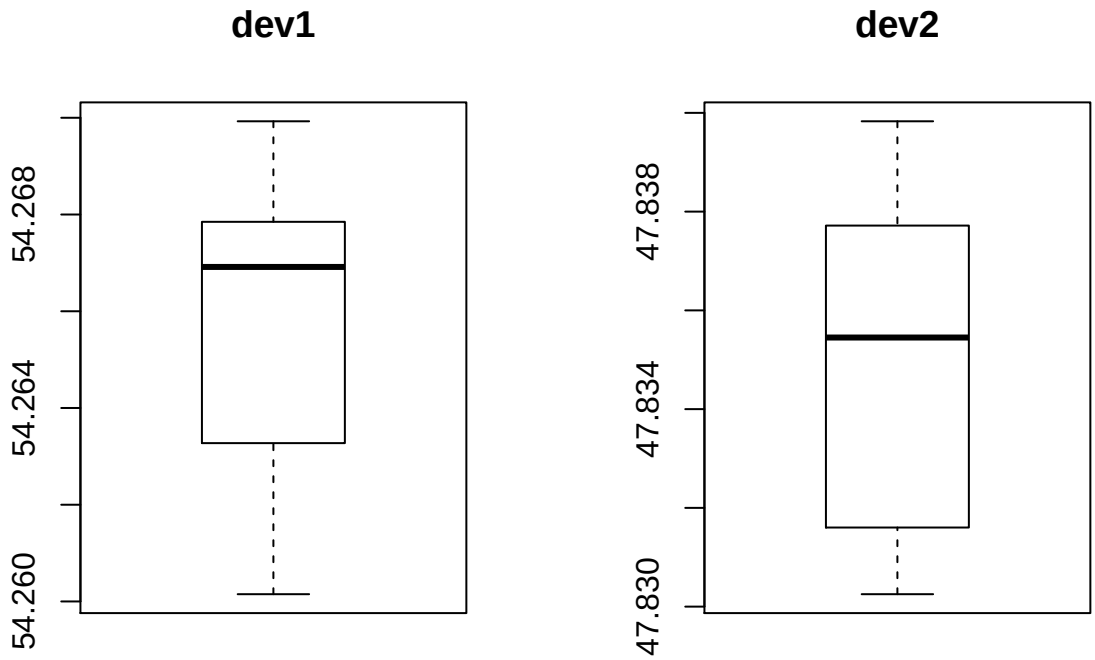
Prob 6

```
data6 <- readRDS("C:/Users/44653/Desktop/gitfile/HW4_data.rds")

func <- function(x){
  #calculate mean, var and correlation
  mean_dev1 <- mean(x$dev1)
  mean_dev2 <- mean(x$dev2)
  sd_dev1 <- sqrt(var(x$dev1))
  sd_dev2 <- sqrt(var(x$dev2))
  cor_12 <- cor(x$dev1, x$dev2)
  dat <- data.frame(mean1=mean_dev1, mean2=mean_dev2,
                    sd1=sd_dev1, sd2=sd_dev2, cor12=cor_12)

  #return in data frame format
  return(dat)
}

dat6 <- data.frame(item=NULL, mean1=NULL, mean2=NULL,
                   sd1=NULL, sd2=NULL, cor12=NULL)

#calculate each item's mean...
for (i in 1:13){
  dat_temp <- func(data6[data6$Observer==i, 2:3])
  dat_temp$item <- i
  dat6 <- rbind(dat6, dat_temp)
}
kable(dat6)
```

mean1	mean2	sd1	sd2	cor12	item
54.26610	47.83472	16.76983	26.93974	-0.0641284	1
54.26873	47.83082	16.76924	26.93573	-0.0685864	2
54.26732	47.83772	16.76001	26.93004	-0.0683434	3

mean1	mean2	sd1	sd2	cor12	item
54.26327	47.83225	16.76514	26.93540	-0.0644719	4
54.26030	47.83983	16.76774	26.93019	-0.0603414	5
54.26144	47.83025	16.76590	26.93988	-0.0617148	6
54.26881	47.83545	16.76670	26.94000	-0.0685042	7
54.26785	47.83590	16.76676	26.93610	-0.0689797	8
54.26588	47.83150	16.76885	26.93861	-0.0686092	9
54.26734	47.83955	16.76896	26.93027	-0.0629611	10
54.26993	47.83699	16.76996	26.93768	-0.0694456	11
54.26692	47.83160	16.77000	26.93790	-0.0665752	12
54.26015	47.83972	16.76996	26.93000	-0.0655833	13

```
#draw plot
op <- par(mfrow = c(1, 2))
boxplot(dat6$mean1, main = "dev1")
boxplot(dat6$mean2, main = "dev2")
```

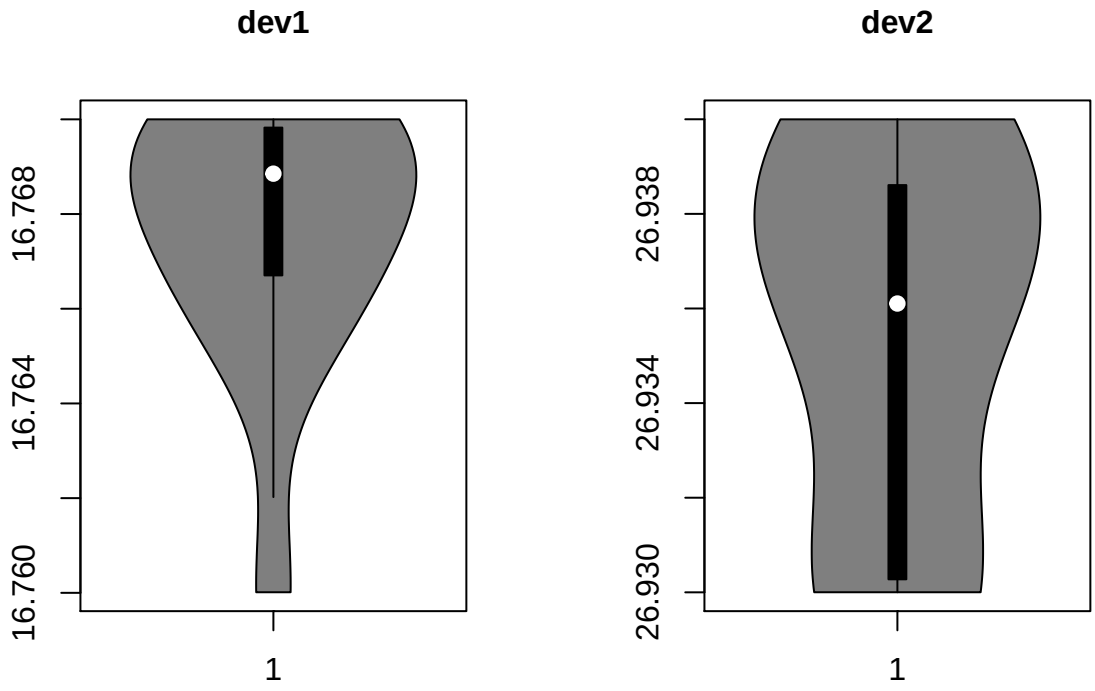



```
vioplot(dat6$sd1, main = "dev1")
```

```
## [1] 16.76001 16.77000
```

```
vioplot(dat6$sd2, main = "dev2")
```

```
## [1] 26.93 26.94
```



Prob 7

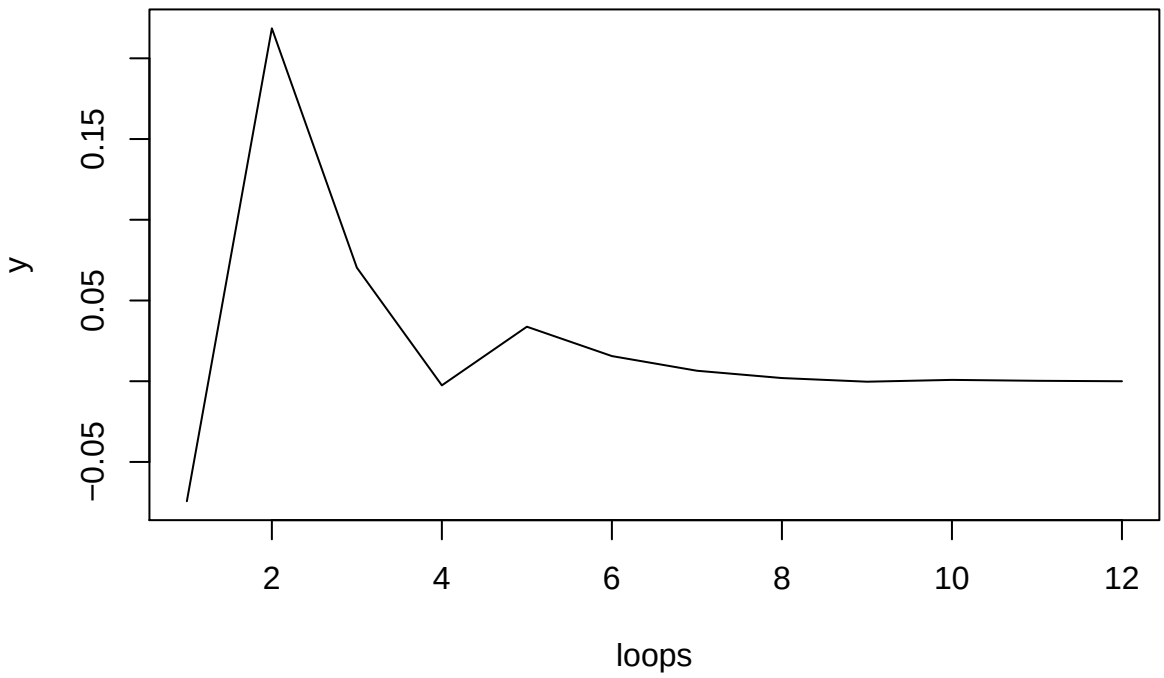
```
func7 <- function(x, a){
  #each bin's area
  area<-a*exp(-x^2/2)

  return(area)
}

dat7 <- data.frame(width=NULL, fx=NULL)
n <- 1
for(j in c(0.02, 0.01, 0.001, 1e-6)){
  #with different width
  f <- 0
  for(i in seq(0, 1, j)[-1]){
    #summation
    f <- f+func7(i, j)
  }

  dat7[n, 1] <- j
  dat7[n, 2] <- f
  n <- n+1
}
```

```
kable(dat7, col.names = c("width","f(x)"))
```

width	f(x)
2e-02	0.8516695
1e-02	0.8536520
1e-03	0.8554276
1e-06	0.8556242

Prob 8

```
x_upper <- -2.8
x_lower <- -3

func1 <- function(x){
  #f(x)
  return(3^x-sin(x)+cos(5*x))
}

fx <- func1(mean(c(x_upper, x_lower)))
y <- c()

while(abs(fx) > 0.0001){

  x_temp <- mean(c(x_upper, x_lower))
  fx <- func1(x_temp)

  if (fx > 0){
    x_upper <- x_temp
  } else {
    x_lower <- x_temp
  }

  y<-c(y, fx) #path
}

plot(y, type="l", xlab = "loops")
```



The interval I choose is [-3, -2.8], f(-2.8)>0 and f(-3)<0.

The standard to terminate the loop is when absolute of f(x) is smaller than 0.0001.