حل التمرین کلاس برنامه نویسی

فواد اسماعیلی

فهرست مطالب

۱ سوال اول

```
for(i in 1:10){
  for(j in 1:10) {
    cat(i*j)
    cat(" ")
  }
  cat("\n")
}
```

```
## 1 2 3 4 5 6 7 8 9 10
## 2 4 6 8 10 12 14 16 18 20
## 3 6 9 12 15 18 21 24 27 30
## 4 8 12 16 20 24 28 32 36 40
## 5 10 15 20 25 30 35 40 45 50
## 6 12 18 24 30 36 42 48 54 60
## 7 14 21 28 35 42 49 56 63 70
## 8 16 24 32 40 48 56 64 72 80
## 9 18 27 36 45 54 63 72 81 90
## 10 20 30 40 50 60 70 80 90 100
```

```
m <- matrix(0,nrow = 10,ncol =10)
for(i in 1:10){
  for(j in 1:10) {
    m[i,j] <- i*j
  }
}
m
```

```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
##  [1,]    1    2    3    4    5    6    7    8    9    10
##  [2,]    2    4    6    8   10   12   14   16   18    20
##  [3,]    3    6    9   12   15   18   21   24   27    30
##  [4,]    4    8   12   16   20   24   28   32   36    40
```

```
##  [5,]    5   10   15   20   25   30   35   40   45    50
##  [6,]    6   12   18   24   30   36   42   48   54    60
##  [7,]    7   14   21   28   35   42   49   56   63    70
##  [8,]    8   16   24   32   40   48   56   64   72    80
##  [9,]    9   18   27   36   45   54   63   72   81    90
## [10,]   10   20   30   40   50   60   70   80   90   100
```

۲ سوال۲

```
f <- function(day) {
  if(as.numeric(day)>7){
    stop("day of the weeks please!")
  }
  switch(day,
       "1"="saturday",
       "2"="sunday",
       "3"="monday",
       "4"="Tuesday",
       "5"="Wednesday",
       "6"="Thursday",
       "7"="Friday"
       )
}
f(10)
```

```
## Error in f(10): day of the weeks please!
```

۳ سوال سوم

```
N <- 30
a <- 7
set.seed(1)
x <- rpois(n=N,lambda = 1)
x
```

```
##  [1] 0 1 1 2 0 2 3 1 1 0 0 0 1 1 2 1 1 4 1 2 3 0 1 0 0 1 0 1 2 0
```

```
# n<- 1,2,3,4,5,6,..., N
# x[1]>=a 1
# x[1]+x[2]>=a 2
# x[1]+x[2]+x[3]>=a 3
# x[1]+x[2]+x[3]+x[4]>=a 4
#...
# x[1]+x[2]+x[3]+x[4]+...+x[N]


a<- 7
for(n in 1:N) {
  s <- sum(x[1:n])
  print(s)
  if(s>=a){
    print("----------")
    print(n)
```

```
    break
  }
}
```

```
## [1] 0
## [1] 1
## [1] 2
## [1] 4
## [1] 4
## [1] 6
## [1] 9
## [1] "----------"
## [1] 7
```

```
cx <- cumsum(x)
min(which(cx>=a))
```

```
## [1] 7
```

۴ سوال چهارم

```
aval <- function(x) {
  if(x<2){
    return(FALSE)
  }
  for(i in 2:x){
    if(i == x) {
      return(TRUE)
    } else {
      if(x%%i ==0) {
        return(FALSE)
      }
    }
  }
}
to_aval <- function(N) {
  x <- c()
  for(i in 1:N) {
    if(aval(i)){
      x <- c(x,i)
    }
  }
  return(x)
}
to_aval(100)
```

```
##  [1]  2  3  5  7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97
```

۵ سوال پنجم

```
x <- c(5,1,4,2,8)
```

```r
# x[1] < x[2]
# x[1] < x[3]
# x[1] < x[4] <- swap the values x[1] <- x[4]; x[4]<- x[1]
# x <- c(1,3,5,2,5,6,2)
# x <- c(1,2,5,3,5,6,2)
#
x <- c(5,1,4,2,8)
for(j in 1:N) {
  for(i in 1:(length(x)-1)) {
  if(x[i] > x[i+1]){
    a <- x[i]
    b <- x[i+1]
    x[i] <- b
    x[i+1] <- a
  }
  print(x)
}
}
```

```
## [1] 1 5 4 2 8
## [1] 1 4 5 2 8
## [1] 1 4 2 5 8
## [1] 1 4 2 5 8
## [1] 1 4 2 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
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## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
```

```
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
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## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
```

```
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
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## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
## [1] 1 2 4 5 8
```

```r
x
```

```
## [1] 1 2 4 5 8
```

```r
x <- c(1,2,3,4,5,1,5,2,5,2,2,3,1,2)
x[x==2] <- 10
f <- function(x) {
  min(x)
  max(x)
  mean(x)
  m <- which.max(table(x))
  m <- as.numeric(names(m))
  res <- list("min" = min(x),"max" = max(x),"mean"=mean(x),"mode"=m)
  return(res)
}
f(x)
```

```
## $min
## [1] 1
##
## $max
## [1] 10
##
## $mean
```

```
## [1] 5.571429
##
## $mode
## [1] 10
```

```
f <- function(x) {
  f()
}
```

```
# 5!
# 5*4!
# 5*4 * 3!
# 5*4 * 3*2!
# 5*4 * 3*2 * 1
#
# 1! = 1
# 0! = 1
```

```
factorial_1 <- function(x) {
  if(x<2){
    return(1)
  }
  x* factorial_1(x-1)
}
factorial_1(6)
```

```
## [1] 720
```

```
f <- function(n) {
  if(n<2) {
    return(1)
  }else {
    r <- 2*f(n-1) + 3 * f(n-2)
    return(r)
  }
}
f(4)
```

```
## [1] 41
```

a^