HW1.Zunqiu.Wang

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1

```
v1 <- 2:6 # construct vector v1
v2 <- 5:9 # construct vector v2
v2-v1 # deduction
```

```
## [1] 3 3 3 3 3
```

```
v1 %*% v2 # vector inner product
```

```
##      [,1]
## [1,]  150
```

```
v3 <- v1+v2 # assign vector addition to v3

# function to replace anynumber greater than 10 with 0
func <- function(v) {
  for (i in 1:length(v)) {
    if (v[i] > 10) {
    v[i] <- 0
  }
}
  print(v)
}
func(v3)
```

```
## [1] 7 9 0 0 0
```

2

```
m1 <- matrix(1:25, nrow=5,ncol=5) # construct a matrix
m1 %*% v1 # matrix and vector multiplication
```

```
##      [,1]
## [1,]  270
## [2,]  290
## [3,]  310
## [4,]  330
## [5,]  350
```

```r
v1 %*% m1 # vector and matrix multiplication
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]   70  170  270  370  470
```

```r
m1 %*% t(m1) # matrix and matrix multiplication
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  855  910  965 1020 1075
## [2,]  910  970 1030 1090 1150
## [3,]  965 1030 1095 1160 1225
## [4,] 1020 1090 1160 1230 1300
## [5,] 1075 1150 1225 1300 1375
```

3

```r
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```r
df <- data.frame(date = seq(ymd('2021-09-01'), ymd('2025-09-01'), by = 'years'),
                 name = c('Jack', 'Xander', 'Frank', 'Lydia', 'Zenko'),
                 age = c(5,4,24,28,27))
str(df)
```

```
## 'data.frame':    5 obs. of  3 variables:
##  $ date: Date, format: "2021-09-01" "2022-09-01" ...
##  $ name: chr  "Jack" "Xander" "Frank" "Lydia" ...
##  $ age : num  5 4 24 28 27
```

```r
write.csv(df, file = 'df.csv',row.names=FALSE,sep="\t") # save df
```

```
## Warning in write.csv(df, file = "df.csv", row.names = FALSE, sep = "\t"):
## attempt to set 'sep' ignored
```

```r
read.csv('df.csv',header=TRUE,stringsAsFactors=FALSE) # read df
```

```
##         date   name age
## 1 2021-09-01   Jack   5
## 2 2022-09-01 Xander   4
## 3 2023-09-01  Frank  24
## 4 2024-09-01  Lydia  28
## 5 2025-09-01  Zenko  27
```

```r
df1 <- df[c(1,3,5), c(1,2)] # subset df

# function to replace even number in 3rd column(the data type is dbl) with 0
replace.func <- function(df) {
  for (i in 1:length(df[,3])) {
    if (df[i,3] %% 2 == 0) {
    df[i,3] <- 0
  }
  }
  print(df)
}
replace.func(df)
```

```
##         date   name age
## 1 2021-09-01   Jack   5
## 2 2022-09-01 Xander   0
## 3 2023-09-01  Frank   0
## 4 2024-09-01  Lydia   0
## 5 2025-09-01  Zenko  27
```

```r
lst <- list(v1,v2,m1,df) # create a list

names(lst) <- c("vector.1", "vector.2", "matrix", "data.frame") # name list

lst[[3]][,2] # specify 2nd column as 2nd item of the matrix
```

```
## [1]  6  7  8  9 10
```

4

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$