

hw1.R

2021-02-08

```
#) Question 1
```

```
#) 1)
```

```
x <- seq(5, 35, by=2)
```

```
x
```

```
## [1] 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35
```

```
length(x)
```

```
## [1] 16
```

```
#) 2)
```

```
A <- matrix(x, nrow = 4, ncol = 4, byrow = T)
```

```
A
```

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

```
## [1,] 5 7 9 11
```

```
## [2,] 13 15 17 19
```

```
## [3,] 21 23 25 27
```

```
## [4,] 29 31 33 35
```

```
#) 3)
```

```
eigen(A)$values
```

```
## [1] 8.381780e+01 -3.817805e+00 -3.786132e-15 6.672852e-16
```

```
#) 4)
```

```
A[c(1, 2), c(1, 2)] <- 7
```

```
A
```

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

```
## [1,] 7 7 9 11
```

```
## [2,] 7 7 17 19
```

```
## [3,] 21 23 25 27
```

```
## [4,] 29 31 33 35
```

```
#) 5)
```

```
det(A)
```

```
## [1] 256
```

```
#) 6)
```

```
solve(A)
```

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

```
## [1,] 0.500 -6.278503e-16 -1.5000 1.0000
```

```
## [2,] -0.375 -1.250000e-01 1.3750 -0.8750
```

```
## [3,] -0.750 2.500000e-01 -0.4375 0.4375
## [4,] 0.625 -1.250000e-01 0.4375 -0.4375
```

```
#) 7)
b <- A[1,]
b
```

```
## [1] 7 7 9 11
```

```
#) 8)
y <- solve(A, b)
y
```

```
## [1] 1.000 -0.750 -2.625 2.625
```

```
#) 9)
pmin(y, pi/2)
```

```
## [1] 1.000000 -0.750000 -2.625000 1.570796
```

```
#) 10)
diag(seq(1, 10, by = 1))
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## [1,] 1    0    0    0    0    0    0    0    0    0
## [2,] 0    2    0    0    0    0    0    0    0    0
## [3,] 0    0    3    0    0    0    0    0    0    0
## [4,] 0    0    0    4    0    0    0    0    0    0
## [5,] 0    0    0    0    5    0    0    0    0    0
## [6,] 0    0    0    0    0    6    0    0    0    0
## [7,] 0    0    0    0    0    0    7    0    0    0
## [8,] 0    0    0    0    0    0    0    8    0    0
## [9,] 0    0    0    0    0    0    0    0    9    0
## [10,] 0    0    0    0    0    0    0    0    0    10
```

```
#) Question 2
```

```
S <- rep(NA, 51)
S[1] <- 0
S[2] <- 1
for(n in 3:51){
  S[n] <- S[n-1] + S[n-2]
}
S[4] # S3
```

```
## [1] 2
```

```
S[51] # S50
```

```
## [1] 12586269025
```

```
#) Question 3
```

```
for(i in 1:100){
  if (i%%3 == 0 && i%%5 == 0){
    print(i)
  }
}
```

```
## [1] 15
## [1] 30
## [1] 45
## [1] 60
## [1] 75
## [1] 90
```

#) Question 4

```
ThreeFiveMultiples <- function(n){
  vec <- c()
  i <- 1
  while(i <= n){
    if (i%%3 == 0 && i%%5 == 0){
      vec <- c(vec, i)
    }
    i <- i + 1
  }
  return(vec)
}
```

```
ThreeFiveMultiples(100)
```

```
## [1] 15 30 45 60 75 90
```

```
ThreeFiveMultiples(200)
```

```
## [1] 15 30 45 60 75 90 105 120 135 150 165 180 195
```

#) Question 5

```
MinDivisor <- function(a, b){
  i <- max(a, b) + 1
  while(!(i %% a == 0 && i %% b == 0)){
    i <- i + 1
  }
  return(i)
}
```

```
MinDivisor(3, 5)
```

```
## [1] 15
```

```
MinDivisor(6, 10)
```

```
## [1] 30
```

#) Question 6

```
JPM <- read.csv("JPM.csv")
JPM
```

```
##      Date    Open   High    Low  Close Adj.Close  Volume
## 1 2018-01-05 109.26 109.55 107.78 108.34   108.34 14155000
## 2 2018-01-08 108.15 108.68 107.70 108.50   108.50 12466500
## 3 2018-01-09 108.72 109.63 108.49 109.05   109.05 13292300
## 4 2018-01-10 109.47 110.70 109.39 110.25   110.25 15834500
## 5 2018-01-11 110.67 110.93 110.05 110.84   110.84 13676800
```

```
## 6 2018-01-12 111.65 112.85 110.84 112.67 112.67 18884200
## 7 2018-01-16 111.51 113.43 111.07 112.27 112.27 22703300
## 8 2018-01-17 111.89 113.30 111.31 112.99 112.99 14940300
## 9 2018-01-18 112.76 113.72 112.27 113.26 113.26 14572900
## 10 2018-01-19 113.94 114.34 112.80 113.01 113.01 18785500
## 11 2018-01-22 112.66 114.39 112.50 114.33 114.33 12475700
## 12 2018-01-23 113.67 114.64 113.35 114.21 114.21 12320800
## 13 2018-01-24 114.86 116.00 114.66 115.67 115.67 15904500
## 14 2018-01-25 116.04 116.17 115.08 115.70 115.70 13510000
## 15 2018-01-26 115.70 116.32 114.96 116.32 116.32 12008000
```

```
subtable <- data.frame(JPM$Open, JPM$High, JPM$Low, JPM$Close)
subtable
```

```
##      JPM.Open JPM.High JPM.Low JPM.Close
## 1      109.26    109.55    107.78    108.34
## 2      108.15    108.68    107.70    108.50
## 3      108.72    109.63    108.49    109.05
## 4      109.47    110.70    109.39    110.25
## 5      110.67    110.93    110.05    110.84
## 6      111.65    112.85    110.84    112.67
## 7      111.51    113.43    111.07    112.27
## 8      111.89    113.30    111.31    112.99
## 9      112.76    113.72    112.27    113.26
## 10     113.94    114.34    112.80    113.01
## 11     112.66    114.39    112.50    114.33
## 12     113.67    114.64    113.35    114.21
## 13     114.86    116.00    114.66    115.67
## 14     116.04    116.17    115.08    115.70
## 15     115.70    116.32    114.96    116.32
```

```
sapply(subtable, mean)
```

```
##      JPM.Open JPM.High JPM.Low JPM.Close
## 112.0633 112.9767 111.4833 112.4940
```