HW2

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# Problems

# Computer exercises

## Question 1

Replicate the following vector of numbers using **seq()** function and call it **v1.**

v1 <- seq(from = 1,to = 17,by = 4)  
v1

[1] 1 5 9 13 17

## Question 2

### part I

Replicate the following matrix in R and call it A.

A <- matrix(20:39,4,5, byrow = TRUE)  
A

[,1] [,2] [,3] [,4] [,5]  
[1,] 20 21 22 23 24  
[2,] 25 26 27 28 29  
[3,] 30 31 32 33 34  
[4,] 35 36 37 38 39

### part II

colnames(A)<-(c('A','B','C','D','E'))  
A

A B C D E  
[1,] 20 21 22 23 24  
[2,] 25 26 27 28 29  
[3,] 30 31 32 33 34  
[4,] 35 36 37 38 39

### part III

B <- A[c(2,4), c("B", "D")]  
B

B D  
[1,] 26 28  
[2,] 36 38

### part IIII

t(B)

[,1] [,2]  
B 26 36  
D 28 38

### part V

B.inverse <- solve(B)  
B.inverse

[,1] [,2]  
B -1.9 1.4  
D 1.8 -1.3

### part VI

B2 <- B.inverse%\*%B  
B2

B D  
B 1 0  
D 0 1

### Question 3 part I

df <- mtcars  
head(df,10)

mpg cyl disp hp drat wt qsec vs am gear carb  
Mazda RX4 21.0 6 160.0 110 3.90 2.620 16.46 0 1 4 4  
Mazda RX4 Wag 21.0 6 160.0 110 3.90 2.875 17.02 0 1 4 4  
Datsun 710 22.8 4 108.0 93 3.85 2.320 18.61 1 1 4 1  
Hornet 4 Drive 21.4 6 258.0 110 3.08 3.215 19.44 1 0 3 1  
Hornet Sportabout 18.7 8 360.0 175 3.15 3.440 17.02 0 0 3 2  
Valiant 18.1 6 225.0 105 2.76 3.460 20.22 1 0 3 1  
Duster 360 14.3 8 360.0 245 3.21 3.570 15.84 0 0 3 4  
Merc 240D 24.4 4 146.7 62 3.69 3.190 20.00 1 0 4 2  
Merc 230 22.8 4 140.8 95 3.92 3.150 22.90 1 0 4 2  
Merc 280 19.2 6 167.6 123 3.92 3.440 18.30 1 0 4 4

### part II

library(dplyr)  
df1<-df  
df1 <- arrange(select(df,c("cyl","hp","wt","vs","am","gear","mpg")),cyl==4)  
head(df1,5)

cyl hp wt vs am gear mpg  
Mazda RX4 6 110 2.620 0 1 4 21.0  
Mazda RX4 Wag 6 110 2.875 0 1 4 21.0  
Hornet 4 Drive 6 110 3.215 1 0 3 21.4  
Hornet Sportabout 8 175 3.440 0 0 3 18.7  
Valiant 6 105 3.460 1 0 3 18.1

### part III

df1<-round(mutate(df1,gpm=1/mpg),3)  
df1

cyl hp wt vs am gear mpg gpm  
Mazda RX4 6 110 2.620 0 1 4 21.0 0.048  
Mazda RX4 Wag 6 110 2.875 0 1 4 21.0 0.048  
Hornet 4 Drive 6 110 3.215 1 0 3 21.4 0.047  
Hornet Sportabout 8 175 3.440 0 0 3 18.7 0.053  
Valiant 6 105 3.460 1 0 3 18.1 0.055  
Duster 360 8 245 3.570 0 0 3 14.3 0.070  
Merc 280 6 123 3.440 1 0 4 19.2 0.052  
Merc 280C 6 123 3.440 1 0 4 17.8 0.056  
Merc 450SE 8 180 4.070 0 0 3 16.4 0.061  
Merc 450SL 8 180 3.730 0 0 3 17.3 0.058  
Merc 450SLC 8 180 3.780 0 0 3 15.2 0.066  
Cadillac Fleetwood 8 205 5.250 0 0 3 10.4 0.096  
Lincoln Continental 8 215 5.424 0 0 3 10.4 0.096  
Chrysler Imperial 8 230 5.345 0 0 3 14.7 0.068  
Dodge Challenger 8 150 3.520 0 0 3 15.5 0.065  
AMC Javelin 8 150 3.435 0 0 3 15.2 0.066  
Camaro Z28 8 245 3.840 0 0 3 13.3 0.075  
Pontiac Firebird 8 175 3.845 0 0 3 19.2 0.052  
Ford Pantera L 8 264 3.170 0 1 5 15.8 0.063  
Ferrari Dino 6 175 2.770 0 1 5 19.7 0.051  
Maserati Bora 8 335 3.570 0 1 5 15.0 0.067  
Datsun 710 4 93 2.320 1 1 4 22.8 0.044  
Merc 240D 4 62 3.190 1 0 4 24.4 0.041  
Merc 230 4 95 3.150 1 0 4 22.8 0.044  
Fiat 128 4 66 2.200 1 1 4 32.4 0.031  
Honda Civic 4 52 1.615 1 1 4 30.4 0.033  
Toyota Corolla 4 65 1.835 1 1 4 33.9 0.029  
Toyota Corona 4 97 2.465 1 0 3 21.5 0.047  
Fiat X1-9 4 66 1.935 1 1 4 27.3 0.037  
Porsche 914-2 4 91 2.140 0 1 5 26.0 0.038  
Lotus Europa 4 113 1.513 1 1 5 30.4 0.033  
Volvo 142E 4 109 2.780 1 1 4 21.4 0.047

### part IIII

str(df1)

'data.frame': 32 obs. of 8 variables:  
 $ cyl : num 6 6 6 8 6 8 6 6 8 8 ...  
 $ hp : num 110 110 110 175 105 245 123 123 180 180 ...  
 $ wt : num 2.62 2.88 3.21 3.44 3.46 ...  
 $ vs : num 0 0 1 0 1 0 1 1 0 0 ...  
 $ am : num 1 1 0 0 0 0 0 0 0 0 ...  
 $ gear: num 4 4 3 3 3 3 4 4 3 3 ...  
 $ mpg : num 21 21 21.4 18.7 18.1 14.3 19.2 17.8 16.4 17.3 ...  
 $ gpm : num 0.048 0.048 0.047 0.053 0.055 0.07 0.052 0.056 0.061 0.058 ...

### part V

df1$vs<-factor(df1$vs)  
df1$am<-factor(df1$am)  
df1$cyl<-factor(df1$cyl)  
df1$gear<-factor(df1$gear)  
str(df1)

'data.frame': 32 obs. of 8 variables:  
 $ cyl : Factor w/ 3 levels "4","6","8": 2 2 2 3 2 3 2 2 3 3 ...  
 $ hp : num 110 110 110 175 105 245 123 123 180 180 ...  
 $ wt : num 2.62 2.88 3.21 3.44 3.46 ...  
 $ vs : Factor w/ 2 levels "0","1": 1 1 2 1 2 1 2 2 1 1 ...  
 $ am : Factor w/ 2 levels "0","1": 2 2 1 1 1 1 1 1 1 1 ...  
 $ gear: Factor w/ 3 levels "3","4","5": 2 2 1 1 1 1 2 2 1 1 ...  
 $ mpg : num 21 21 21.4 18.7 18.1 14.3 19.2 17.8 16.4 17.3 ...  
 $ gpm : num 0.048 0.048 0.047 0.053 0.055 0.07 0.052 0.056 0.061 0.058 ...

### Question 4 part I

c<-table(alcohol$abuse)  
prop.table(c)

0 1   
0.90083486 0.09916514

The prop table shows that percentage of men that abuse alcohol, which is .0991, or about 10%.

### part II

c<-table(alcohol$employ)  
prop.table(c)

0 1   
0.1018123 0.8981877

The employment rate is 89.81%, or about 90%.

### part III

c<-table(alcohol$employ, alcohol$abuse)  
prop.table(c, margin = 2)

0 1  
 0 0.09900542 0.12731006  
 1 0.90099458 0.87268994

The employment rate of those that abuse alcohol, noted as (1,1) on the table above, is 0.87268994, or about 87.26%.

### part IIII

The employment rate of those who do not abuse alcohol, noted as (0,1) on the table above, is 0.90099458, or about 90.1%.

### part V

Based on these observations alone, it cannot be concluded whether or not alcohol causes unemployment, as there is a <3% difference in those who are and are not abusers of alcohol.