Date: 29th December 2018

1. **Implement user defined functions within apply function using the mtcars data set and produce column wise summary statistics using apply function and mtcars dataset.**

mtcars

mtcars.summary<-apply(mtcars, 2, function(x) c(mean(x), sd(x), max(x), min(x), var(x)))

mtcars.summary

str(mtcars)

apply(mtcars,2, mean)

```
Console    Terminal ×
~/ 

> mtcars.summary<-apply(mtcars, 2, function(x) c(mean(x), sd(x), max(x), min(x), var(x)))
> mtcars.summary
            mpg      cyl       disp        hp       drat        wt       qsec        vs        am       gear      carb
[1,] 20.090625 6.187500   230.7219  146.68750 3.5965625 3.2172500 17.848750 0.4375000 0.4062500 3.6875000 2.812500
[2,]  6.026948 1.785922   123.9387   68.56287 0.5346787 0.9784574  1.786943 0.5040161 0.4989909 0.7378041 1.615200
[3,] 33.900000 8.000000   472.0000  335.00000 4.9300000 5.4240000 22.900000 1.0000000 1.0000000 5.0000000 8.000000
[4,] 10.400000 4.000000    71.1000   52.00000 2.7600000 1.5130000 14.500000 0.0000000 0.0000000 3.0000000 1.000000
[5,] 36.324103 3.189516 15360.7998 4700.86694 0.2858814 0.9573790  3.193166 0.2540323 0.2489919 0.5443548 2.608871
        predicted         error   obs_no
[1,] 20.090625 -2.081668e-17 16.500000
[2,]  5.480168  2.508359e+00  9.380832
[3,] 29.312380  5.853791e+00 32.000000
[4,]  9.192487 -3.940979e+00  1.000000
[5,] 30.032240  6.291863e+00 88.000000
> str(mtcars)
'data.frame':    32 obs. of  14 variables:
 $ mpg      : num  21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
 $ cyl      : num  6 6 4 6 8 6 8 4 4 6 ...
 $ disp     : num  160 160 108 258 360 ...
 $ hp       : num  110 110 93 110 175 105 245 62 95 123 ...
 $ drat     : num  3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
 $ wt       : num  2.62 2.88 2.32 3.21 3.44 ...
 $ qsec     : num  16.5 17 18.6 19.4 17 ...
 $ vs       : num  0 0 1 1 0 1 0 1 1 1 ...
 $ am       : num  1 1 1 0 0 0 0 0 0 0 ...
 $ gear     : num  4 4 4 3 3 3 3 4 4 4 ...
 $ carb     : num  4 4 1 1 2 1 4 2 2 4 ...
 $ predicted: num  23.6 22.6 25.3 21.3 18.3 ...
 $ error    : num  -2.572 -1.583 -2.476 0.135 0.373 ...
 $ obs_no   : int  1 2 3 4 5 6 7 8 9 10 ...
> apply(mtcars,2,mean)
          mpg          cyl         disp           hp         drat           wt         qsec           vs
 2.009062e+01 6.187500e+00 2.307219e+02 1.466875e+02 3.596563e+00 3.217250e+00 1.784875e+01 4.375000e-01
           am         gear         carb    predicted        error       obs_no
 4.062500e-01 3.687500e+00 2.812500e+00 2.009062e+01 -2.081668e-17 1.650000e+01
> |
```
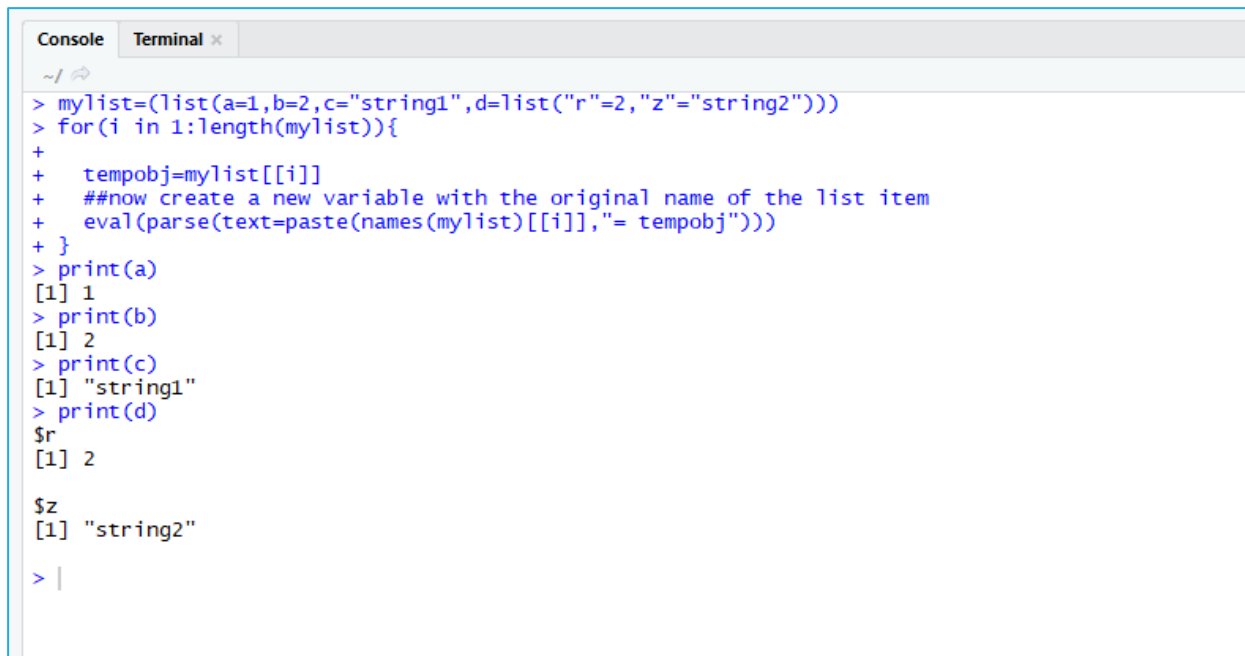
2. Write a program to extract the names of the list.

OPTION A

```
mylist=(list(a=1,b=2,c="string1",d=list("r"=2,"z"="string2")))
for(i in 1:length(mylist)){
   tempobj=mylist[[i]]
  ##now create a new variable with the original name of the list item
  eval(parse(text=paste(names(mylist)[[i]],"= tempobj")))
}
print(a)
print(b)
print(c)
print(d)
```

```
Console   Terminal ×
~/
> mylist=(list(a=1,b=2,c="string1",d=list("r"=2,"z"="string2")))
> for(i in 1:length(mylist)){
+
+    tempobj=mylist[[i]]
+    ##now create a new variable with the original name of the list item
+    eval(parse(text=paste(names(mylist)[[i]],"= tempobj")))
+ }
> print(a)
[1] 1
> print(b)
[1] 2
> print(c)
[1] "string1"
> print(d)
$r
[1] 2

$z
[1] "string2"

> |
```

OPTION B

```
n = c(2, 3, 5)
s = c("aa", "bb", "cc", "dd", "ee")
b = c(TRUE, FALSE, TRUE, FALSE, FALSE)
x = list(n, s, b, 3)   # x contains copies of n, s, b
x[2]
x[c(2,3)]
```

```
> n = c(2, 3, 5)
> s = c("aa", "bb", "cc", "dd", "ee")
> b = c(TRUE, FALSE, TRUE, FALSE, FALSE)
> x = list(n, s, b, 3)   # x contains copies of n, s, b
> x[2]
[[1]]
[1] "aa" "bb" "cc" "dd" "ee"

> x[c(2,3)]
[[1]]
[1] "aa" "bb" "cc" "dd" "ee"

[[2]]
[1]  TRUE FALSE  TRUE FALSE FALSE

>
```