A. 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

```
> 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       qse
c         vs         am
[1,] 20.090625 6.187500   230.7219  146.68750 3.5965625 3.2172500 17.84875
0 0.4375000 0.4062500
[2,]  6.026948 1.785922   123.9387   68.56287 0.5346787 0.9784574  1.78694
3 0.5040161 0.4989909
[3,] 33.900000 8.000000   472.0000  335.00000 4.9300000 5.4240000 22.90000
0 1.0000000 1.0000000
[4,] 10.400000 4.000000    71.1000   52.00000 2.7600000 1.5130000 14.50000
0 0.0000000 0.0000000
[5,] 36.324103 3.189516 15360.7998 4700.86694 0.2858814 0.9573790  3.19316
6 0.2540323 0.2489919
          gear     carb
[1,] 3.6875000 2.812500
[2,] 0.7378041 1.615200
[3,] 5.0000000 8.000000
[4,] 3.0000000 1.000000
[5,] 0.5443548 2.608871
```

str(mtcars)

```
> str(mtcars)
'data.frame':   32 obs. of  11 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 ...
```

apply(mtcars,2,mean)

```
> apply(mtcars,2,mean)
       mpg        cyl       disp         hp       drat         wt       qs
ec         vs
 20.090625   6.187500 230.721875 146.687500   3.596563   3.217250  17.8487
50   0.437500
        am       gear       carb
  0.406250   3.687500   2.812500
```

B. **write a program to extract the names of the list.**

```
> names(mtcars)
 [1] "mpg"  "cyl"  "disp" "hp"   "drat" "wt"   "qsec" "vs"   "am"   "gear"
"carb"
```