1. What is the basic difference and similarity between a vector and a matrix?

Difference: Vectors are single dimensional either row or column where in matrix has both

Similarity: They both can store data of same data type

2. What is the basic difference and similarity between a data frame and a matrix?

Difference: Matrix can have data of same data type where in Data frames can have data of different data types.

Similarity: Both matrix and data frame are multi-dimensional i.e., rows X columns

3. Create a vector using (15, TRUE, “World”). What happened to your result?

Because vector can store data of single type, the input will be converted in character (explicit coercion)

```
p <- c(15, TRUE, "world")
print(p)
class(p)
```

```
> p <- c(15, TRUE, "world")
> print(p)
[1] "15"    "TRUE"  "world"
> class(p)
[1] "character"
```

4. John’s scores in the final semester for the three subjects are 95, 91, and 88. The subjects are Statistics, Linear Algebra, and Calculus. Using these create a vector and give names to all elements of the vector based on their subjects.

```
#John's scores in the final semester
marks <- c(95,91,88)
subjects <- c("Statistics", "Linear Algebra", "Calculus")
names(marks) <- subjects
print(marks)
```

```
> marks <- c(95,91,88)
> subjects <- c("Statistics", "Linear Algebra", "Calculus")
> names(marks) <- subjects
> print(marks)
    Statistics Linear Algebra       Calculus
            95              91             88
```

5. Please check the types (character or numeric) of the vector you created

```
#check types of vectors
class(marks)
class(subjects)
```

```
> class(marks)
[1] "numeric"
> class(subjects)
[1] "character"
```

6. You have three students in your class (choose any name you want). You must create a matrix using their score in the above mentioned subjects (question 4) Student 1 (95, 91, and 88), Student 2(96, 94, and 97), Student 3(88, 98, and 85). Create a matrix and label column and row names.

```
#Three student marks
sreejith_marks <- c(95,91,88)
prakruthi_marks <-c(96, 94, 97)
Nair_marks <- c(88,98,85)
stdnames <- c("Sreejith", "Prakruthi", "Nair")
stdmarks <- c(sreejith_marks, prakruthi_marks, Nair_marks)

stdmatrix <- matrix(stdmarks, nrow=3, byrow=TRUE, dimnames = list(stdnames,
                                                                  subjects))
stdmatrix
```

```
> sreejith_marks <- c(95,91,88)
> prakruthi_marks <-c(96, 94, 97)
> Nair_marks <- c(88,98,85)
> stdnames <- c("Sreejith", "Prakruthi", "Nair")
> stdmarks <- c(sreejith_marks, prakruthi_marks, Nair_marks)
>
> stdmatrix <- matrix(stdmarks, nrow=3, byrow=TRUE, dimnames = list(stdnames, subject
s))
> stdmatrix
          Statistics Linear Algebra Calculus
Sreejith          95              91       88
Prakruthi         96              94       97
Nair              88              98       85
>
```

7. Convert the created matrix into a data frame

```
#converting matrix to dataframe
dframe <- data.frame(stdmatrix)
dframe
```

```
> #converting matrix to dataframe
> dframe <- data.frame(stdmatrix)
> dframe
          Statistics Linear.Algebra Calculus
Sreejith          95              91       88
Prakruthi         96              94       97
Nair              88              98       85
```

8. Create three vectors using five countries (your choice) from the following website. The first vector should be country names, the second vector should be the total number of cases, and the third vector should contain the total number of deaths. Create a data frame using these vectors.

```
#creating dataframes using vectors
conames <- c("India", "USA", "Brazil", "Russia", "France")
totcases <- c(11845748, 30715420, 12227179, 4492692, 4378446)
totdeaths <- c(160982, 558580, 301087, 96612, 93180)
dframe1 <- data.frame(conames,totcases, totdeaths)
dframe1
```

```
> #creating dataframes using vectors
> conames <- c("India", "USA", "Brazil", "Russia", "France")
> totcases <- c(11845748, 30715420, 12227179, 4492692, 4378446)
> totdeaths <- c(160982, 558580, 301087, 96612, 93180)
> dframe1 <- data.frame(conames,totcases, totdeaths)
> dframe1
  conames totcases totdeaths
1   India 11845748    160982
2     USA 30715420    558580
3  Brazil 12227179    301087
4  Russia  4492692     96612
5  France  4378446     93180
```

9. Please read the mtcars data set from R. It is an built-in data set. Please check the structure of the data set. If required, please convert the data into their appropriate data types (character, logical, factor, etc). Save your results as a new data frame using a new name.

```
#mtcars
data(mtcars)
str(mtcars)
sapply(mtcars, class)
newcar <- within(mtcars,{
  vs <- as.logical(vs)
  am <- as.logical(am)
  cyl <- as.factor(cyl)
})
newcar
```

```
> sapply(mtcars, class)
      mpg       cyl      disp        hp      drat        wt      qsec        vs
"numeric" "numeric" "numeric" "numeric" "numeric" "numeric" "numeric" "numeric"
       am      gear      carb
"numeric" "numeric" "numeric"
> newcar <- within(mtcars,{
+   vs <- as.logical(vs)
+   am <- as.logical(am)
+   cyl <- as.factor(cyl)
+ })
> newcar
                   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 FALSE  TRUE    4    4
Mazda RX4 Wag     21.0   6 160.0 110 3.90 2.875 17.02 FALSE  TRUE    4    4
Datsun 710        22.8   4 108.0  93 3.85 2.320 18.61  TRUE  TRUE    4    1
Hornet 4 Drive    21.4   6 258.0 110 3.08 3.215 19.44  TRUE FALSE    3    1
Hornet Sportabout 18.7   8 360.0 175 3.15 3.440 17.02 FALSE FALSE    3    2
Valiant           18.1   6 225.0 105 2.76 3.460 20.22  TRUE FALSE    3    1
Duster 360        14.3   8 360.0 245 3.21 3.570 15.84 FALSE FALSE    3    4
Merc 240D         24.4   4 146.7  62 3.69 3.190 20.00  TRUE FALSE    4    2
Merc 230          22.8   4 140.8  95 3.92 3.150 22.90  TRUE FALSE    4    2
Merc 280          19.2   6 167.6 123 3.92 3.440 18.30  TRUE FALSE    4    4
Merc 280C         17.8   6 167.6 123 3.92 3.440 18.90  TRUE FALSE    4    4
Merc 450SE        16.4   8 275.8 180 3.07 4.070 17.40 FALSE FALSE    3    3
Merc 450SL        17.3   8 275.8 180 3.07 3.730 17.60 FALSE FALSE    3    3
Merc 450SLC       15.2   8 275.8 180 3.07 3.780 18.00 FALSE FALSE    3    3
Cadillac Fleetwood  10.4   8 472.0 205 2.93 5.250 17.98 FALSE FALSE    3    4
Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82 FALSE FALSE    3    4
Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42 FALSE FALSE    3    4
Fiat 128          32.4   4  78.7  66 4.08 2.200 19.47  TRUE  TRUE    4    1
Honda Civic       30.4   4  75.7  52 4.93 1.615 18.52  TRUE  TRUE    4    2
Toyota Corolla    33.9   4  71.1  65 4.22 1.835 19.90  TRUE  TRUE    4    1
Toyota Corona     21.5   4 120.1  97 3.70 2.465 20.01  TRUE FALSE    3    1
Dodge Challenger  15.5   8 318.0 150 2.76 3.520 16.87 FALSE FALSE    3    2
AMC Javelin       15.2   8 304.0 150 3.15 3.435 17.30 FALSE FALSE    3    2
Camaro Z28        13.3   8 350.0 245 3.73 3.840 15.41 FALSE FALSE    3    4
Pontiac Firebird  19.2   8 400.0 175 3.08 3.845 17.05 FALSE FALSE    3    2
Fiat X1-9         27.3   4  79.0  66 4.08 1.935 18.90  TRUE  TRUE    4    1
```