Assignment - 1

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

Ans:
Differences:
A **vector** is a list of numbers (can be **in a** row or column), A **matrix** is an **array** of numbers (one or more rows, one or more columns). Two vector can be a matrix, a matrix can not be a vactor.

 Similarities:

Matrix and vector both can have data types as logical, integer, double, character in R.

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

Ans:

Differences:

Matrix	Dataframe
The data stored in columns can be only of same data type.	The data stored must be numeric, character or factor type.
It's m*n array with similar data type.	It is a list of vector of equal length. It is a generalized form of matrix.

 Similarities:

Matrix and vector both are m*n arrays.

3. Create a vector using (15, TRUE, "World"). What happened to your result?
Ans:
The result will be a character vector with 3 strings.

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.

Ans:

```
Subjects_vector <- c("Statistics", "Linear Algebra", "Calculus")
Score_vector <- c(95, 91, 88)
names(Score_vector) <- Subjects_vector
Score_vector
```

Output:

Statistics	Linear Algebra	Calculus
95	91	88

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

Ans:
```
typeof(Subjects_vector)
```
Output:
```
 "character"
```
```
typeof(Score_vector)
```
Output:
```
"double"
```

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.

Ans:
```
student_names <- c("Umme", "Rubaiyat", "Chowdhury")
alex_scores <- c(95, 91,88)
nia_scores <- c(96, 94,97)
robin_scores <- c(88, 98, 85)
student_scores <- c(alex_scores, nia_scores, robin_scores)
student_matrix <- matrix(student_scores, nrow=3, byrow=TRUE, dimnames = list(
  student_names, subjects_vector))
student_matrix
```
Output:

	Statistics	Linear Algebra	Calculus
Umme	95	91	88
Rubaiyat	96	94	97

Chowdhury   88   98   85
7. Convert the created matrix into a data frame.

Ans:
dframe <- data.frame(student_matrix)
dframe
Output:

Statistics Linear.Algebra Calculus
Umme   95   91   88
Rubaiyat   96   94   97
Chowdhury   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.
https://www.worldometers.info/coronavirus/

Ans:
countryNames <- c("Bangladesh", "USA", "India", "Russia", "France")
totalCases <- c(588132,30639264, 11734058, 4483471, 4313073)
totalDeath <- c(8830,556891, 160477, 96219, 92908)
cov_dframe <- data.frame(countryNames, totalCases, totalDeath)
cov_dframe

Output:

	countryNames	totalCases	totalDeath
1	Bangladesh	588132	8830
2	USA	30639264	556891
3	India	11734058	160477
4	Russia	4483471	96219
5	France	4313073	92908

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.

Ans:

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

Output:

	mpg	cyl	disp	hp	drat	wt	qsec	vs
Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	FALSE
Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	FALSE
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	TRUE
Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	TRUE
Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	FALSE
Valiant	18.1	6	225.0	105	2.76	3.460	20.22	TRUE
Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	FALSE
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	TRUE
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	TRUE
Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	TRUE
Merc 280C	17.8	6	167.6	123	3.92	3.440	18.90	TRUE
Merc 450SE	16.4	8	275.8	180	3.07	4.070	17.40	FALSE
Merc 450SL	17.3	8	275.8	180	3.07	3.730	17.60	FALSE
Merc 450SLC	15.2	8	275.8	180	3.07	3.780	18.00	FALSE
Cadillac Fleetwood	10.4	8	472.0	205	2.93	5.250	17.98	FALSE
Lincoln Continental	10.4	8	460.0	215	3.00	5.424	17.82	FALSE
Chrysler Imperial	14.7	8	440.0	230	3.23	5.345	17.42	FALSE
Fiat 128	32.4	4	78.7	66	4.08	2.200	19.47	TRUE
Honda Civic	30.4	4	75.7	52	4.93	1.615	18.52	TRUE
Toyota Corolla	33.9	4	71.1	65	4.22	1.835	19.90	TRUE
Toyota Corona	21.5	4	120.1	97	3.70	2.465	20.01	TRUE
Dodge Challenger	15.5	8	318.0	150	2.76	3.520	16.87	FALSE
AMC Javelin	15.2	8	304.0	150	3.15	3.435	17.30	FALSE
Camaro Z28	13.3	8	350.0	245	3.73	3.840	15.41	FALSE
Pontiac Firebird	19.2	8	400.0	175	3.08	3.845	17.05	FALSE
Fiat X1-9	27.3	4	79.0	66	4.08	1.935	18.90	TRUE
Porsche 914-2	26.0	4	120.3	91	4.43	2.140	16.70	FALSE
Lotus Europa	30.4	4	95.1	113	3.77	1.513	16.90	TRUE

Ford Pantera L	15.8	8	351.0	264	4.22	3.170	14.50	FALSE
Ferrari Dino	19.7	6	145.0	175	3.62	2.770	15.50	FALSE
Maserati Bora	15.0	8	301.0	335	3.54	3.570	14.60	FALSE
Volvo 142E	21.4	4	121.0	109	4.11	2.780	18.60	TRUE

	am	gear	carb
Mazda RX4	TRUE	4	4
Mazda RX4 Wag	TRUE	4	4
Datsun 710	TRUE	4	1
Hornet 4 Drive	FALSE	3	1
Hornet Sportabout	FALSE	3	2
Valiant	FALSE	3	1
Duster 360	FALSE	3	4
Merc 240D	FALSE	4	2
Merc 230	FALSE	4	2
Merc 280	FALSE	4	4
Merc 280C	FALSE	4	4
Merc 450SE	FALSE	3	3
Merc 450SL	FALSE	3	3
Merc 450SLC	FALSE	3	3
Cadillac Fleetwood	FALSE	3	4
Lincoln Continental	FALSE	3	4
Chrysler Imperial	FALSE	3	4
Fiat 128	TRUE	4	1
Honda Civic	TRUE	4	2
Toyota Corolla	TRUE	4	1
Toyota Corona	FALSE	3	1
Dodge Challenger	FALSE	3	2
AMC Javelin	FALSE	3	2
Camaro Z28	FALSE	3	4
Pontiac Firebird	FALSE	3	2
Fiat X1-9	TRUE	4	1
Porsche 914-2	TRUE	5	2
Lotus Europa	TRUE	5	2
Ford Pantera L	TRUE	5	4
Ferrari Dino	TRUE	5	6
Maserati Bora	TRUE	5	8
Volvo 142E	TRUE	4	2