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DATE: 4-3-2021

LAB EXPERIMENT 1

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INTRODUCTION TO PROGRAMMING IN R

</div>

AIM:

To perform basic operations in R and to work with Tables

Question: DATA SET- POPULATION OF INDIA

1. Consider the following dataset:

https://www.worldometers.info/world-population/india-population/

Population of India (2020 and historical)

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	India Global Rank
2020	**1,380,004,385**	0.99 %	13,586,631	-532,687	28.4	2.24	464	35.0	483,098,640	17.70 %	7,794,798,739	2

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	India Global Rank
								%				
2019	**1,366,417,754**	1.02 %	13,775,474	-532,687	27.1	2.36	460	34.5 %	471,828,295	17.71 %	7,713,468,100	2
2018	**1,352,642,280**	1.04 %	13,965,495	-532,687	27.1	2.36	455	34.1 %	460,779,764	17.73 %	7,631,091,040	2
2017	**1,338,676,785**	1.07 %	14,159,536	-532,687	27.1	2.36	450	33.6 %	449,963,381	17.74 %	7,547,858,925	2
2016	**1,324,517,249**	1.10 %	14,364,846	-532,687	27.1	2.36	445	33.2 %	439,391,699	17.75 %	7,464,022,049	2
2015	**1,310,152,403**	1.20 %	15,174,247	-470,015	26.8	2.40	441	32.7 %	429,069,459	17.75 %	7,379,797,139	2
2010	**1,234,281,170**	1.47 %	17,334,249	-531,169	25.1	2.80	415	30.8 %	380,744,554	17.74 %	6,956,823,603	2
2005	**1,147,609,927**	1.67 %	18,206,876	-377,797	23.8	3.14	386	29.1 %	334,479,406	17.54 %	6,541,907,027	2

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	India Global Rank
2000	**1,056,575,549**	1.85 %	18,530,592	-136,514	22.7	3.48	355	27.6 %	291,350,282	17.20 %	6,143,493,823	2
1995	**963,922,588**	1.99 %	18,128,958	-110,590	21.8	3.83	324	26.5 %	255,558,824	16.78 %	5,744,212,979	2
1990	**873,277,798**	2.17 %	17,783,558	9,030	21.1	4.27	294	25.5 %	222,296,728	16.39 %	5,327,231,061	2
1985	**784,360,008**	2.33 %	17,081,433	115,942	20.6	4.68	264	24.3 %	190,321,782	16.10 %	4,870,921,740	2
1980	**698,952,844**	2.32 %	15,169,989	222,247	20.2	4.97	235	23.0 %	160,941,941	15.68 %	4,458,003,514	2
1975	**623,102,897**	2.33 %	13,582,621	421,208	19.7	5.41	210	21.3 %	132,533,810	15.27 %	4,079,480,606	2
1970	**555,189,792**	2.15 %	11,213,294	-68,569	19.3	5.72	187	19.7 %	109,388,950	15.00 %	3,700,437,046	2
1965	**499,123,324**	2.07 %	9,715,129	-17,078	19.6	5.89	168	18.7	93,493,844	14.95 %	3,339,583,597	2

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	India Global Rank
								%				
1960	**450,547,679**	1.91 %	8,133,417	-30,805	20.2	5.90	152	17.9 %	80,565,723	14.85 %	3,034,949,748	2
1955	**409,880,595**	1.72 %	6,711,079	-21,140	20.7	5.90	138	17.6 %	71,958,495	14.78 %	2,773,019,936	2

1. Create a data frame with the above data.

2. Find the summary of the whole data set. (Use appropriate syntax)

3. Find the mean, median for the population of India between 1955 and 2020 and justify your answer.

4. Find the variance, standard deviation of population of India and population of the world.

5. calculate the average density.

6. Any other notable analysis from the above dataset.

1] Data frame:

Command:

a=read.csv("D:/VIT/First-Yr-Winter/Maths Practicals/Data/Lab1.csv")

a

Output:

```
> a=read.csv("D:/VIT/First-Yr-Winter/Maths Practicals/Data/Lab1.csv")
> a
   Year Population Yearly.change.. Yearly.Change Migrants..net. Median.Age Fertility.Rate Density..P.Km.
1  2020 1380004385           0.99%      13586631        -532687       28.4           2.24           464
2  2019 1366417754           1.02%      13775474        -532687       27.1           2.36           460
3  2018 1352642280           1.04%      13965495        -532687       27.1           2.36           455
4  2017 1338676785           1.07%      14159536        -532687       27.1           2.36           450
5  2016 1324517249           1.10%      14364846        -532687       27.1           2.36           445
6  2015 1310152403           1.20%      15174247        -470015       26.8           2.40           441
7  2010 1234281170           1.47%      17334249        -531169       25.1           2.80           415
8  2005 1147609927           1.67%      18206876        -377797       23.8           3.14           386
9  2000 1056575549           1.85%      18530592        -136514       22.7           3.48           355
10 1995  963922588           1.99%      18128958        -110590       21.8           3.83           324
11 1990  873277798           2.17%      17783558           9030       21.1           4.27           294
12 1985  784360008           2.33%      17081433         115942       20.6           4.68           264
13 1980  698952844           2.32%      15169989         222247       20.2           4.97           235
14 1975  623102897           2.33%      13582621         421208       19.7           5.41           210
15 1970  555189792           2.15%      11213294         -68569       19.3           5.72           187
16 1965  499123324           2.07%       9715129         -17078       19.6           5.89           168
17 1960  450547679           1.91%       8133417         -30805       20.2           5.90           152
18 1955  409880595           1.72%       6711079         -21140       20.7           5.90           138
   Urban.Pop Urban.Population Country.s.Share.of.World.Pop World.Population India.Global.Rank
1     35.00%        483098640                       17.70%       7794798739                 2
2     34.50%        471828295                       17.71%       7713468100                 2
3     34.10%        460779764                       17.73%       7631091040                 2
4     33.60%        449963381                       17.74%       7547858925                 2
5     33.20%        439391699                       17.75%       7464022049                 2
6     32.70%        429069459                       17.75%       7379797139                 2
7     30.80%        380744554                       17.74%       6956823603                 2
8     29.10%        334479406                       17.54%       6541907027                 2
9     27.60%        291350282                       17.20%       6143493823                 2
10    26.50%        255558824                       16.78%       5744212979                 2
11    25.50%        222296728                       16.39%       5327231061                 2
12    24.30%        190321782                       16.10%       4870921740                 2
13    23.00%        160941941                       15.68%       4458003514                 2
14    21.30%        132533810                       15.27%       4079480606                 2
15    19.70%        109388950                       15.00%       3700437046                 2
16    18.70%         93493844                       14.95%       3339583597                 2
17    17.90%         80565723                       14.85%       3034949748                 2
18    17.60%         71958495                       14.78%       2773019936                 2
> |
```
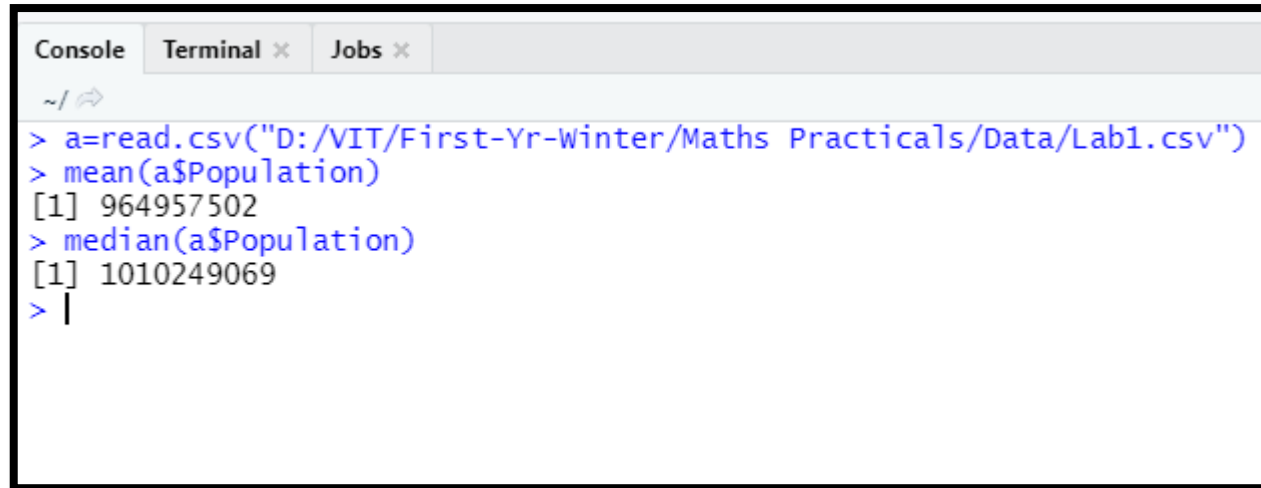
2]

```
> a=read.csv("D:/VIT/First-Yr-Winter/Maths Practicals/Data/Lab1.csv")
> summary(a)
      Year          Population         Yearly.change..      Yearly.Change       Migrants..net.       Median.Age
 Min.   :1955   Min.   :4.099e+08   Length:18          Min.   : 6711079    Min.   :-532687    Min.   :19.30
 1st Qu.:1976   1st Qu.:6.421e+08   Class :character   1st Qu.:13583624    1st Qu.:-532308    1st Qu.:20.30
 Median :1998   Median :1.010e+09   Mode  :character   Median :14262191    Median :-123552    Median :22.25
 Mean   :1994   Mean   :9.650e+08                      Mean   :14256524    Mean   :-203260    Mean   :23.24
 3rd Qu.:2016   3rd Qu.:1.321e+09                      3rd Qu.:17271045    3rd Qu.: -18094    3rd Qu.:27.02
 Max.   :2020   Max.   :1.380e+09                      Max.   :18530592    Max.   : 421208    Max.   :28.40
 Fertility.Rate  Density..P.Km.    Urban.Pop          Urban.Population     Country.s.Share.of.World.Pop
 Min.   :2.240   Min.   :138.0   Length:18          Min.   : 71958495    Length:18
 1st Qu.:2.370   1st Qu.:216.2   Class :character   1st Qu.:139635843    Class :character
 Median :3.655   Median :339.5   Mode  :character   Median :273454553    Mode  :character
 Mean   :3.893   Mean   :324.6                      Mean   :280986976
 3rd Qu.:5.300   3rd Qu.:444.0                      3rd Qu.:436811139
 Max.   :5.900   Max.   :464.0                      Max.   :483098640
 World.Population    India.Global.Rank
 Min.   :2.773e+09   Min.   :2
 1st Qu.:4.174e+09   1st Qu.:2
 Median :5.944e+09   Median :2
 Mean   :5.695e+09   Mean   :2
 3rd Qu.:7.443e+09   3rd Qu.:2
 Max.   :7.795e+09   Max.   :2
>
```

3]

```
Console    Terminal ×    Jobs ×

~/ ⤷
> a=read.csv("D:/VIT/First-Yr-Winter/Maths Practicals/Data/Lab1.csv")
> mean(a$Population)
[1] 964957502
> median(a$Population)
[1] 1010249069
> |
```

As we can see from the Data Frame shown before, from the year 1955 to 1995- which happens to be a 40 years gap-, India's

population plummeted from **409,880,595** to a staggering **963,922,588** which is a **554,041,993** jump in population and has

reached the margin of a billion and also crossed it in 1956. It continues to stay above it from then till the present year 2020

(which is a 25-year jump). In 2020, India has around 1.3 billion as its demographics. This sudden and continues rise in

population causes the mean and median of India's demographics to touch the 1billion.

4]

```
Console   Terminal ×   Jobs ×
~/ ⇨
> a=read.csv("D:/VIT/First-Yr-Winter/Maths Practicals/Data/Lab1.csv")
> var(a$Population)
[1] 1.277892e+17
> sd(a$World.Population)
[1] 1786228737
> |
```

5]

```
Console   Terminal ×   Jobs ×
~/ ⇨
> a=read.csv("D:/VIT/First-Yr-Winter/Maths Practicals/Data/Lab1.csv")
> mean(a$Density..P.Km.)
[1] 324.6111
> |
```

The Overviews

In 1955, India was a country of **409,880,595** people who was just recovering from 200 years (who happen to rule for about 200 years or more) of colonial rule and with the majority of the population facing poverty. Due to this poverty-ridden population, people started more as they felt insecure and also because at the times (around 1947) the country's life expectancy was only about 27 years. From 1955 till 1975 country's Fertility rate had plummeted up to 5.9 and stayed there till the fall of 1975 while the population (in 1960) was **450,547,679** with a total land area of **3,287,590** sq. km (becoming the 7th largest country and adds up to 2% to the world landmass but add up to 14.37% to world population), the country was innocent as to how this high Fertility rate could affect them, which later snowballed into a huge 1.3 billion (in demographics) in 2020(adding to about 17.7% to the world population while still being of the same size).

But with that being said India's fertility rate has gone down ever since 1955 which was about 5.9 to around 4.9 in 1980 to 3.14 in 2005 and has come down even more to a value of 2.24 in 2020. And this has occurred as a result of India's consistent development, its population got more educated and hence could easily support their families. Also, the rise in the country's economy helped its health care services to rise as India went from 41 years of life expectancy

in 1960 to an astonishing 70 years of life expectancy in 2018 and that's just in 50 years from their republic freedom from the colonial rule and that to in a country where around 75% of the population is rural.

Due to this 75% being rural population and agriculture still being the backbone of the nation's economy the countries must focus on developing or rather enhancing rural India rather than turning them into urban cities.