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LAB EXPERIMENT 1

INTRODUCTION TO PROGRAMMING IN R

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/Km ²)	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
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

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km ²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	India Global Rank
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
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

Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km ²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	India Global Rank
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
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.

Syntax

```
tab1 = read.csv("C:\\Users\\monis\\Desktop\\world_population.csv")  
  
tab1
```

Output

```
> tab1 = read.csv("C:\\Users\\monis\\Desktop\\world_population.csv")  
>  
> tab1
```

	Year	TotPop	YrlyChangePC	YrlyChange	MigrantsNet	MedianAge	FertilityRate	Density.P.Km²	UrbanPopPC	UrbanPop	ShareOfWorldPop	WorldPop	GlbRnk
1	2020	1380004385	0.99	13586631	-532687	28.4	2.24	464	35.0	483098640	17.70	7794798739	2
2	2019	1366417754	1.02	13775474	-532687	27.1	2.36	460	34.5	471828295	17.71	7713468100	2
3	2018	1352642280	1.04	13965495	-532687	27.1	2.36	455	34.1	460779764	17.73	7631091040	2
4	2017	1338676785	1.07	14159536	-532687	27.1	2.36	450	33.6	449963381	17.74	7547858925	2
5	2016	1324517249	1.10	14364846	-532687	27.1	2.36	445	33.2	439391699	17.75	7464022049	2
6	2015	1310152403	1.20	15174247	-470015	26.8	2.40	441	32.7	429069459	17.75	7379797139	2
7	2010	1234281170	1.47	17334249	-531169	25.1	2.80	415	30.8	380744554	17.74	6956823603	2
8	2005	1147609927	1.67	18206876	-377797	23.8	3.14	386	29.1	334479406	17.54	6541907027	2
9	2000	1056575549	1.85	18530592	-136514	22.7	3.48	355	27.6	291350282	17.20	6143493823	2
10	1995	963922588	1.99	18128958	-110590	21.8	3.83	324	26.5	255558824	16.78	5744212979	2
11	1990	873277798	2.17	17783558	9030	21.1	4.27	294	25.5	222296728	16.39	5327231061	2
12	1985	784360008	2.33	17081433	115942	20.6	4.68	264	24.3	190321782	16.10	4870921740	2
13	1980	698952844	2.32	15169989	222247	20.2	4.97	235	23.0	160941941	15.68	4458003514	2
14	1975	623102897	2.33	13582621	421208	19.7	5.41	210	21.3	132533810	15.27	4079480606	2
15	1970	555189792	2.15	11213294	-68569	19.3	5.72	187	19.7	109388950	15.00	3700437046	2
16	1965	499123324	2.07	9715129	-17078	19.6	5.89	168	18.7	93493844	14.95	3339583597	2
17	1960	450547679	1.91	8133417	-30805	20.2	5.90	152	17.9	80565723	14.85	3034949748	2
18	1955	409880595	1.72	6711079	-21140	20.7	5.90	138	17.6	71958495	14.78	2773019936	2

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

Syntax

```
summary(tab1)
```

Output

```
> summary(tab1)
```

Year	TotPop	YrlyChangePC	YrlyChange	MigrantsNet	MedianAge	FertilityRate	Density.P.Km ²
Min. :1955	Min. :4.099e+08	Min. :0.990	Min. : 6711079	Min. : -532687	Min. :19.30	Min. :2.240	Min. :138.0
1st Qu.:1976	1st Qu.:6.421e+08	1st Qu.:1.125	1st Qu.:13583624	1st Qu.: -532308	1st Qu.:20.30	1st Qu.:2.370	1st Qu.:216.2
Median :1998	Median :1.010e+09	Median :1.785	Median :14262191	Median : -123552	Median :22.25	Median :3.655	Median :339.5
Mean :1994	Mean :9.650e+08	Mean :1.689	Mean :14256524	Mean : -203260	Mean :23.24	Mean :3.893	Mean :324.6
3rd Qu.:2016	3rd Qu.:1.321e+09	3rd Qu.:2.130	3rd Qu.:17271045	3rd Qu.: -18094	3rd Qu.:27.02	3rd Qu.:5.300	3rd Qu.:444.0
Max. :2020	Max. :1.380e+09	Max. :2.330	Max. :18530592	Max. : 421208	Max. :28.40	Max. :5.900	Max. :464.0

UrbanPopPC	UrbanPop	ShareOfWorldPop	WorldPop	GlbRnk
Min. :17.60	Min. : 71958495	Min. :14.78	Min. :2.773e+09	Min. :2
1st Qu.:21.73	1st Qu.:139635843	1st Qu.:15.37	1st Qu.:4.174e+09	1st Qu.:2
Median :27.05	Median :273454553	Median :16.99	Median :5.944e+09	Median :2
Mean :26.95	Mean :280986976	Mean :16.59	Mean :5.695e+09	Mean :2
3rd Qu.:33.08	3rd Qu.:436811139	3rd Qu.:17.73	3rd Qu.:7.443e+09	3rd Qu.:2
Max. :35.00	Max. :483098640	Max. :17.75	Max. :7.795e+09	Max. :2

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

Syntax

```
mean(tab1$TotPop)

median(tab1$TotPop)
```

Output

```
> mean(tab1$TotPop)
[1] 964957502
>
>
> median(tab1$TotPop)
[1] 1010249069
```

Justification

From the data, we can find that the mean population of India between 1955 to 2020 is 964,957,502 (approximately in 1994-1995) and similarly median population is 1,010,249,069 (approximately in year 1999-2000). Thus, there was a greater rate of rise in population in the span of past 20 years (2000-20) compared to that of 45-year span of 1955-2000.

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

Syntax

```
var(tab1$TotPop)
var(tab1$WorldPop)

sd(tab1$TotPop)
sd(tab1$WorldPop)
```

Output

```
> var(tab1$TotPop)
[1] 1.277892e+17
> var(tab1$WorldPop)
[1] 3.190613e+18
>
> sd(tab1$TotPop)
[1] 357476221
> sd(tab1$WorldPop)
[1] 1786228737
```


5. calculate the average density.

Syntax

```
mean(tab1$`Density.P.Km2`)
```

Output

```
>  
> mean(tab1$`Density.P.Km2`)  
[1] 324.6111
```

6. Any other notable analysis from the above dataset.

Average of India's Share of Total World Population:

Syntax

```
mean(tab1$ShareOfWorldPop)
```

Output

```
>  
> mean(tab1$ShareOfWorldPop)  
[1] 16.59222
```

From the dataset and output, we can conclude that India contributes an average of about 16.59% of world's population, and hence making it the second most populated nation.