DATA ANALYSIS

The datasheet url (https://datausa.io/api/data?drilldowns=State&measures=Population) present in the problem statement contains the population data for multiple states for the year 2013 to 2020.

Considering particular state (Alabama for example), below are entries present in the datasheet for the year 2013-2020

{"ID State":"04000US01","State":"Alabama","ID Year":2020,"Year":"2020","Population":4893186,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2019,"Year":"2019","Population":4876250,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2018,"Year":"2018","Population":4864680,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2017,"Year":"2017","Population":4850771,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2016,"Year":"2016","Population":4841164,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2015,"Year":"2015","Population":4830620,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2014,"Year":"2014","Population":4817678,"Slug State":"alabama"}

{"ID State":"04000US01","State":"Alabama","ID Year":2013,"Year":"2013","Population":4799277,"Slug State":"alabama"}

The ask from the assesment is to calculate the percentage increase or decrease for each particular year from its previous year and also to determine the Prime factors for the final year which is in our case is 2020.

If we consider year 2013 and 2014 , we can see that there is a minimal surge in the population which is calculated to approx 0.38%, similarly there can be a possibility that the population for the current year can be lower than its previous year, in that case poulation percentage will be in negative.

Based on these findings, I have decided to use MS EXCEL formulas to calculate the population increase or decrease from its previous year.

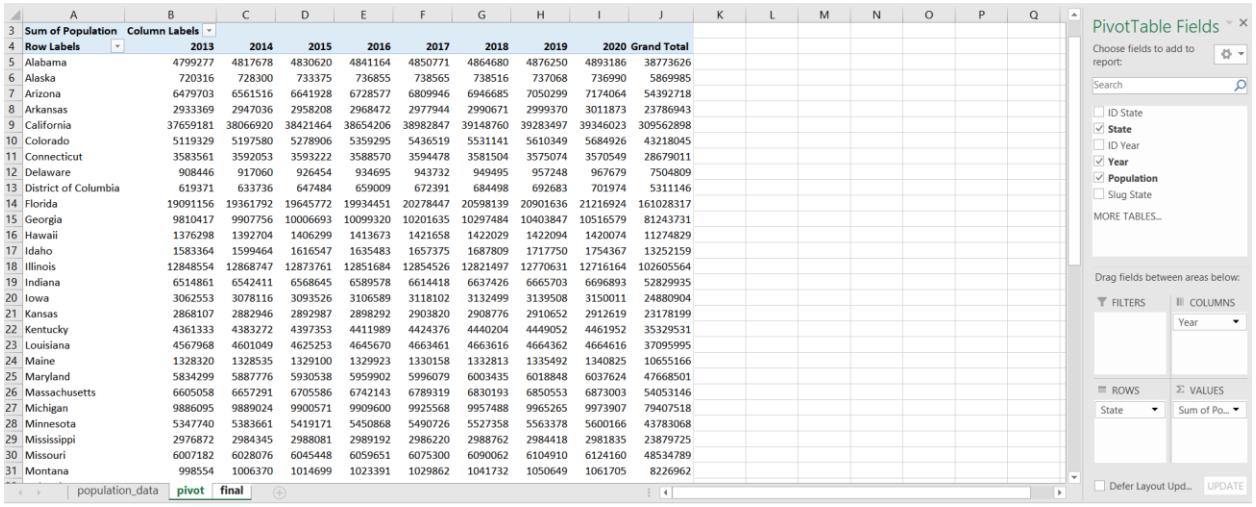
For the other scenerio, I also have to calculate the prime Factor for the final year. For that I have analysed a little and came with a solution to use EXCEL macros and with the help of VB script I have calculated the Prime factors.

POWERSHELL

1. **Extract data from URL provided in the problem statement**.
   Invoke-RestMethod -Method Get -Uri "https://datausa.io/api/data?drilldowns=State&measures=Population" -OutFile out.json
2. **Convert Extracted Data to JSON Object**
   $data = Get-Content out.json | ConvertFrom-Json
3. **Extract "data" sub-object from JSON object and Converted it to CSV Object**.
4. **CSV object is then write out to File**.
   $data.data | Export-Csv -NoTypeInformation population_data.csv

EXCEL

1. **Open the CSV File in MS Excel. (Sheet named as population_data)**
2. **Create Pivot Table for the given Data (Sheet Named as Pivot)**
   a. **State Field as Rows**
   b. **Years Field as Column**
   c. **Population Field as Value**

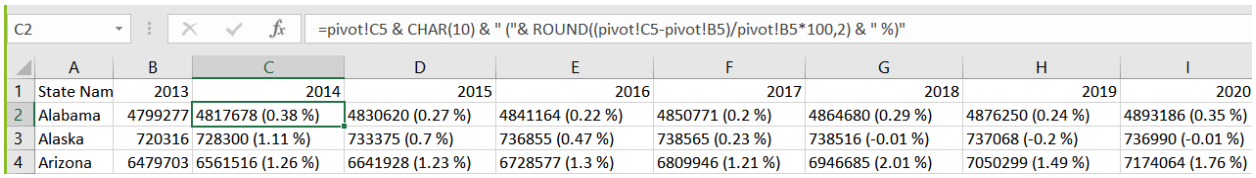


Sum of Population	Column Labels								
Row Labels	2013	2014	2015	2016	2017	2018	2019	2020	Grand Total
Alabama	4799277	4817678	4830620	4841164	4850771	4864680	4876250	4893186	38773626
Alaska	720316	728300	733375	736855	738565	738516	737068	736990	5869985
Arizona	6479703	6561516	6641928	6728577	6809946	6946685	7050299	7174064	54392718
Arkansas	2933369	2947036	2958208	2968472	2977944	2990671	2999370	3011873	23786943
California	37659181	38066920	38421464	38654206	38982847	39148760	39283497	39346023	309562898
Colorado	5119329	5197580	5278906	5359295	5436519	5531141	5610349	5684926	43218045
Connecticut	3583561	3592053	3593222	3588570	3594478	3581504	3575074	3570549	28679011
Delaware	908446	917060	926454	934695	943732	949495	957248	967679	7504809
District of Columbia	619371	633736	647484	659009	672391	684498	692683	701974	5311146
Florida	19091156	19361792	19645772	19934451	20278447	20598139	20901636	21216924	161028317
Georgia	9810417	9907756	10006693	10099320	10201635	10297484	10403847	10516579	81243731
Hawaii	1376298	1392704	1406299	1413673	1421658	1422029	1422094	1420074	11274829
Idaho	1583364	1599464	1616547	1635483	1657375	1687809	1717750	1754367	13252159
Illinois	12848554	12868747	12873761	12851684	12854526	12821497	12770631	12716164	102605564
Indiana	6514861	6542411	6568645	6589578	6614418	6637426	6665703	6696893	52829935
Iowa	3062553	3078116	3093526	3106589	3118102	3132499	3139508	3150011	24880904
Kansas	2868107	2882946	2892987	2898292	2903820	2908776	2910652	2912619	23178199
Kentucky	4361333	4383272	4397353	4411989	4424376	4440204	4449052	4461952	35329531
Louisiana	4567968	4601049	4625253	4645670	4663461	4663616	4664362	4664616	37095995
Maine	1328320	1328535	1329100	1329923	1330158	1332813	1335492	1340825	10655166
Maryland	5834299	5887776	5930538	5959902	5996079	6003435	6018848	6037624	47668501
Massachusetts	6605058	6657291	6705586	6742143	6789319	6830193	6850553	6873003	54053146
Michigan	9886095	9889024	9900571	9909600	9925568	9957488	9965265	9973907	79407518
Minnesota	5347740	5383661	5419171	5450868	5490726	5527358	5563378	5600166	43783068
Mississippi	2976872	2984345	2988081	2989192	2986220	2988762	2984418	2981835	23879725
Missouri	6007182	6028076	6045448	6059651	6075300	6090062	6104910	6124160	48534789
Montana	998554	1006370	1014699	1023391	1029862	1041732	1050649	1061705	8226962

3. **Copy the pivot table data generated in separate sheet (Sheet Named as Final).**

Row Labels	2013	2014	2015	2016	2017	2018	2019	2020
Alabama	4799277	4817678	4830620	4841164	4850771	4864680	4876250	4893186
Alaska	720316	728300	733375	736855	738565	738516	737068	736990
Arizona	6479703	6561516	6641928	6728577	6809946	6946685	7050299	7174064
Arkansas	2933369	2947036	2958208	2968472	2977944	2990671	2999370	3011873
California	37659181	38066920	38421464	38654206	38982847	39148760	39283497	39346023
Colorado	5119329	5197580	5278906	5359295	5436519	5531141	5610349	5684926
Connecticut	3583561	3592053	3593222	3588570	3594478	3581504	3575074	3570549
Delaware	908446	917060	926454	934695	943732	949495	957248	967679
District of Columbia	619371	633736	647484	659009	672391	684498	692683	701974
Florida	19091156	19361792	19645772	19934451	20278447	20598139	20901636	21216924
Georgia	9810417	9907756	10006693	10099320	10201635	10297484	10403847	10516579
Hawaii	1376298	1392704	1406299	1413673	1421658	1422029	1422094	1420074
Idaho	1583364	1599464	1616547	1635483	1657375	1687809	1717750	1754367
Illinois	12848554	12868747	12873761	12851684	12854526	12821497	12770631	12716164
Indiana	6514861	6542411	6568645	6589578	6614418	6637426	6665703	6696893
Iowa	3062553	3078116	3093526	3106589	3118102	3132499	3139508	3150011
Kansas	2868107	2882946	2892987	2898292	2903820	2908776	2910652	2912619
Kentucky	4361333	4383272	4397353	4411989	4424376	4440204	4449052	4461952
Louisiana	4567968	4601049	4625253	4645670	4663461	4663616	4664362	4664616
Maine	1328320	1328535	1329100	1329923	1330158	1332813	1335492	1340825
Maryland	5834299	5887776	5930538	5959902	5996079	6003435	6018848	6037624
Massachusetts	6605058	6657291	6705586	6742143	6789319	6830193	6850553	6873003
Michigan	9886095	9889024	9900571	9909600	9925568	9957488	9965265	9973907
Minnesota	5347740	5383661	5419171	5450868	5490726	5527358	5563378	5600166
Mississippi	2976872	2984345	2988081	2989192	2986220	2988762	2984418	2981835
Missouri	6007182	6028076	6045448	6059651	6075300	6090062	6104910	6124160
Montana	998554	1006370	1014699	1023391	1029862	1041732	1050649	1061705

4. **Calculate population percentage increase/decrease using EXCEL formula taking refrence from the pivot table.**
   =pivot!C5 & CHAR(10) & " ("& ROUND((pivot!C5-pivot!B5/pivot!B5*100,2) & " %)"



	A	B	C	D	E	F	G	H	I
1	State Nam	2013	2014	2015	2016	2017	2018	2019	2020
2	Alabama	4799277	4817678 (0.38 %)	4830620 (0.27 %)	4841164 (0.22 %)	4850771 (0.2 %)	4864680 (0.29 %)	4876250 (0.24 %)	4893186 (0.35 %)
3	Alaska	720316	728300 (1.11 %)	733375 (0.7 %)	736855 (0.47 %)	738565 (0.23 %)	738516 (-0.01 %)	737068 (-0.2 %)	736990 (-0.01 %)
4	Arizona	6479703	6561516 (1.26 %)	6641928 (1.23 %)	6728577 (1.3 %)	6809946 (1.21 %)	6946685 (2.01 %)	7050299 (1.49 %)	7174064 (1.76 %)

5. **Apply the above formula on all the other data cells.**

6. **Calculate Prime Factors for the final year using VB script.**

J
Prime Factor (2020)
2;3;41;19891
2;5;73699
2;2;2;2;448379
17;23;7703
3;587;22343
2;13;218651
3;31;38393
23;42073
2;7;7;13;19;29
2;2;3;3;3;196453
47;223757
2;3;3;78893
3;584789
2;2;349;9109
7;956699
23;151;907
3;97;10009
2;2;2;2;2;2;2;11;3169
2;2;2;3;11;17669
5;5;53633
2;2;2;754703
3;3;19;40193
919;10853
2;3;11;13;61;107
3;3;5;23;43;67
2;2;2;2;2;2;2;5;7;1367
5;59;59;61
2;19;50627