```
import numpy as np
import pandas as pd
from datascience import *
import matplotlib.pyplot as plt
%matplotlib inline
plt.style.use('fivethirtyeight')
from google.colab import files
```

```
/usr/local/lib/python3.7/dist-packages/datascience/tables.py:17: MatplotlibDeprecationWarning: The 'warn' parameter of use() is deprecate
  matplotlib.use('agg', warn=False)
/usr/local/lib/python3.7/dist-packages/datascience/util.py:10: MatplotlibDeprecationWarning: The 'warn' parameter of use() is deprecated
  matplotlib.use('agg', warn=False)
```

```
files.upload()
```

Choose Files nc-est2015-…sex-res.csv

- **nc-est2015-agesex-res.csv**(text/csv) - 20831 bytes, last modified: 9/29/2021 - 100% done

```
Saving nc-est2015-agesex-res.csv to nc-est2015-agesex-res.csv
{'nc-est2015-agesex-res.csv': b'SEX,AGE,CENSUS2010POP,ESTIMATESBASE2010,POPESTIMATE2010,POPESTIMATE2011,POPESTIMATE2012,POPESTIMATE2013,P
```

```
# steps 1,2,3

table1 = Table.read_table('nc-est2015-agesex-res.csv')
us_pop = table1.relabeled('POPESTIMATE2010','2010').relabeled('POPESTIMATE2015','2015').select('SEX','AGE','2010','2015')
us_pop.set_format([2,3], NumberFormatter)
us_pop
```

SEX	AGE	2010	2015
0	0	3,951,330	3,978,038
0	1	3,957,888	3,968,564
0	2	4,090,862	3,966,583
0	3	4,111,920	3,974,061
0	4	4,077,551	4,020,035
0	5	4,064,653	4,018,158
0	6	4,073,013	4,019,207
0	7	4,043,046	4,148,360
0	8	4,025,604	4,167,887
0	9	4,125,415	4,133,564

... (296 rows omitted)

```
# steps 4,5,6

change = []
total_growth = []
for j in us_pop.rows:
  change.append(j[3]-j[2])
  total_growth.append((j[3]/j[2])-1)

census = us_pop.with_column('Change', change).with_column('Total Growth', total_growth)
census = census.sort('Change', descending=True)
census.set_format(4, NumberFormatter).set_format(5, PercentFormatter)
census
```

SEX	AGE	2010	2015	Change	Total Growth
0	999	309,346,863	321,418,820	12,071,957	3.90%
1	999	152,088,043	158,229,297	6,141,254	4.04%
2	999	157,258,820	163,189,523	5,930,703	3.77%
0	68	2,359,816	3,436,357	1,076,541	45.62%
0	64	2,706,055	3,536,156	830,101	30.68%
0	65	2,678,525	3,450,043	771,518	28.80%
0	66	2,621,335	3,344,134	722,799	27.57%
0	67	2,693,707	3,304,187	610,480	22.66%
0	72	1,883,820	2,469,605	585,785	31.10%
2	68	1,254,117	1,812,428	558,311	44.52%

... (296 rows omitted)

```
# steps 7,8

t = 5    # 5 year difference (2015-2010 = 5)
annual_growth = []
for i in census.rows:
  annual_growth.append(((i[3]/i[2])**(1/t)) - 1)  ## correction here, i[2] & i[3] were flipped originally

census = census.with_column('Annual Growth', annual_growth)
census = census.sort('Annual Growth', descending=True)
census.set_format(6, PercentFormatter)
census
```

SEX	AGE	2010	2015	Change	Total Growth	Annual Growth
1	100	9,352	15,088	5,736	61.33%	10.04%
1	99	6,104	9,577	3,473	56.90%	9.43%
1	97	14,775	23,092	8,317	56.29%	9.34%
1	94	43,827	68,135	24,308	55.46%	9.23%
1	98	9,505	14,719	5,214	54.86%	9.14%
1	95	31,736	48,015	16,279	51.30%	8.63%
1	96	22,022	32,585	10,563	47.97%	8.15%
1	93	60,182	88,660	28,478	47.32%	8.06%
1	68	1,105,699	1,623,929	518,230	46.87%	7.99%
0	68	2,359,816	3,436,357	1,076,541	45.62%	7.81%

... (296 rows omitted)

```
# steps 9,10,11,12,13

step9 = census.drop('2010').where('AGE', are.below(999)).where('SEX', are.above(0))
males = step9.where('SEX', 1)
females = step9.where('SEX', 2)
combined = males.join('AGE', females)

age = []
males_arr = []
females_arr = []

#print(combined.row(0))   ## To see layout of 'combined'

for i in combined.rows:
  age.append(i[0])
  males_arr.append(i[2])
  females_arr.append(i[7])

fig, ax = plt.subplots()
ax.plot(age, females_arr, label='Females', color='k')
ax.plot(age, males_arr, label='Males', color='orange')
ax.set_title('Male and Female Populations by Age (2015)\n')
ax.legend()
plt.xlabel('Age')
plt.ylabel('Population size')
plt.show()
```