JPellegrino-ProjectP2-Member

March 15, 2023

[471]:
```
import pandas as pd
import numpy as np
```

[472]:
```
# Initial state data from project part 1
full_state_data = pd.read_csv("covid19_superdata.csv")
display(full_state_data)
```

```
      countyFIPS             County Name State  StateFIPS  2020-01-22_x  \
0              0  statewide unallocated    AL          1             0
1           1001          autauga county    AL          1             0
2           1003          baldwin county    AL          1             0
3           1005          barbour county    AL          1             0
4           1007             bibb county    AL          1             0
…            …                       …   …          …             …
3184       56037       sweetwater county    WY         56             0
3185       56039            teton county    WY         56             0
3186       56041            uinta county    WY         56             0
3187       56043         washakie county    WY         56             0
3188       56045           weston county    WY         56             0

      2020-01-23_x  2020-01-24_x  2020-01-25_x  2020-01-26_x  2020-01-27_x  \
0                0             0             0             0             0
1                0             0             0             0             0
2                0             0             0             0             0
3                0             0             0             0             0
4                0             0             0             0             0
…              …             …             …             …             …
3184             0             0             0             0             0
3185             0             0             0             0             0
3186             0             0             0             0             0
3187             0             0             0             0             0
3188             0             0             0             0             0

      …  2023-01-28_y  2023-01-29_y  2023-01-30_y  2023-01-31_y  \
0     …             0             0             0             0
1     …           230           230           230           230
2     …           723           723           723           723
3     …           103           103           103           103
```

```
4     …           109           109           109           109
…   …           …             …             …             …
3184  …           137           137           137           137
3185  …            16            16            16            16
3186  …            43            43            43            43
3187  …            47            47            47            47
3188  …            22            22            22            22

      2023-02-01_y  2023-02-02_y  2023-02-03_y  2023-02-04_y  2023-02-05_y  \
0                0             0             0             0             0
1              230           230           230           230           230
2              723           723           723           723           723
3              103           103           103           103           103
4              109           109           109           109           109
…              …             …             …             …             …
3184           137           137           137           137           137
3185            16            16            16            16            16
3186            43            43            43            43            43
3187            47            47            47            47            47
3188            22            22            22            22            22

      population
0              0
1          55869
2         223234
3          24686
4          22394
…          …
3184       42343
3185       23464
3186       20226
3187        7805
3188        6927

[3189 rows x 2227 columns]
```

1 Data Manipulation

[473]:
```
full_state_data = full_state_data.drop(full_state_data.loc[:, 'countyFIPS':
↪'County Name'].columns, axis=1)
```

[474]:
```
full_state_data = full_state_data.drop(['StateFIPS'], axis=1)
```

[475]:
```
full_state_data = full_state_data.drop(full_state_data.loc[:, '2020-01-22_x':
↪'2022-05-31_x'].columns, axis=1)
```

[476]:
```
full_state_data = full_state_data.drop(full_state_data.loc[:, '2023-01-01_x':
↪'2022-05-31_y'].columns, axis=1)
```

[477]:
```
full_state_data = full_state_data.drop(full_state_data.loc[:, '2023-01-01_y':].
↪columns, axis=1)
```

[478]:
```
full_state_data_revised = pd.DataFrame(full_state_data.copy())
display(full_state_data_revised)
```

```
     State  2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  \
0       AL             0             0             0             0
1       AL         15969         15978         15978         15978
2       AL         56580         56648         56648         56648
3       AL          5710          5714          5714          5714
4       AL          6508          6512          6512          6512
…    …            …             …             …             …
3184    WY         11178         11178         11178         11178
3185    WY         10229         10229         10229         10229
3186    WY          5681          5681          5681          5681
3187    WY          2369          2369          2369          2369
3188    WY          1594          1594          1594          1594

      2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  \
0                0             0             0             0             0
1            15978         16032         16052         16065         16084
2            56648         56895         56955         57024         57079
3             5714          5719          5733          5734          5744
4             6512          6534          6535          6540          6544
…             …             …             …             …             …
3184         11178         11178         11178         11178         11234
3185         10229         10229         10229         10229         10403
3186          5681          5681          5681          5681          5702
3187          2369          2369          2369          2369          2371
3188          1594          1594          1594          1594          1604

      …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
0     …             0             0             0             0
1     …           230           230           230           230
2     …           719           719           719           719
3     …           103           103           103           103
4     …           108           108           108           108
…  …            …             …             …             …
3184  …           136           136           136           136
3185  …            16            16            16            16
3186  …            43            43            43            43
3187  …            47            47            47            47
3188  …            22            22            22            22
```

```
      2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
0                0             0             0             0             0
1              230           230           230           230           230
2              719           719           719           719           719
3              103           103           103           103           103
4              108           108           108           108           108
…              …             …             …             …             …
3184           136           136           136           136           136
3185            16            16            16            16            16
3186            43            43            43            43            43
3187            47            47            47            47            47
3188            22            22            22            22            22

      2022-12-31_y
0                0
1              230
2              719
3              103
4              108
…              …
3184           136
3185            16
3186            43
3187            47
3188            22

[3189 rows x 429 columns]
```

2 Individual States Data

Pennsylvania

[479]:
```
pennsylvania = full_state_data_revised[full_state_data_revised.State=='PA'].
↪iloc[:,:]
display(pennsylvania.head(5))
```

```
     State  2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  \
2278    PA             0             0             0             0
2279    PA         25756         25756         25756         25756
2280    PA        282476        282476        282476        282476
2281    PA         15671         15671         15671         15671
2282    PA         41637         41637         41637         41637

      2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  \
2278             0             0             0             0             0
2279         25756         25756         25756         25943         25943
2280        282476        282476        282476        285367        285367
```

```
2281         15671         15671         15671         15750         15750
2282         41637         41637         41637         41943         41943

      …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
2278  …             0             0             0             0
2279  …           406           406           406           406
2280  …          3698          3698          3698          3698
2281  …           378           378           378           378
2282  …           810           810           810           810

      2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
2278             0             0             0             0             0
2279           406           406           406           406           406
2280          3698          3698          3703          3703          3703
2281           378           378           379           379           379
2282           810           810           812           812           812

      2022-12-31_y
2278             0
2279           406
2280          3703
2281           379
2282           812

[5 rows x 429 columns]
```

Illinois

[480]:
```
illinois = full_state_data_revised[full_state_data_revised.State=='IL'].iloc[:,:
↪]
display(illinois.head(5))
```

```
    State  2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  \
605    IL           284           284           284           284
606    IL         22733         22753         22753         22753
607    IL          1306          1309          1309          1309
608    IL          4456          4472          4472          4472
609    IL         14519         14559         14559         14559

     2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  \
605           284           284           284           284           284
606         22753         22753         22753         22753         22753
607          1309          1309          1309          1309          1309
608          4472          4472          4472          4472          4472
609         14559         14559         14559         14559         14559

     …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
605  …         11397         11397         11397         11397
```

```
606  …           225           225           225           225
607  …            16            16            16            16
608  …            31            31            31            31
609  …           124           124           124           124

     2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
605         11397         11397         11397         11397         11397
606           225           225           225           225           225
607            16            16            16            16            16
608            31            31            31            31            31
609           124           124           124           124           124

     2022-12-31_y
605         11397
606           225
607            16
608            31
609           124

[5 rows x 429 columns]
```

Ohio

[481]:
```
ohio = full_state_data_revised[full_state_data_revised.State=='OH'].iloc[:,:]
display(ohio.head(5))
```

```
     State  2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  \
2074    OH             0             0             0             0
2075    OH          7060          7095          7095          7095
2076    OH         27842         27940         27940         27940
2077    OH         12220         12291         12291         12291
2078    OH         20930         21071         21071         21071

      2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  \
2074             0             0             0             0             0
2075          7095          7095          7095          7095          7144
2076         27940         27940         27940         27940         28067
2077         12291         12291         12291         12291         12359
2078         21071         21071         21071         21071         21189

      …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
2074  …             5             5             5             5
2075  …           160           160           160           160
2076  …           502           502           502           502
2077  …           234           234           234           234
2078  …           460           460           460           460

      2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
```

```
2074              5              5              5              5              5
2075            160            160            160            161            161
2076            502            502            502            502            502
2077            234            234            234            234            234
2078            460            460            460            462            462

      2022-12-31_y
2074              5
2075            161
2076            502
2077            234
2078            462

[5 rows x 429 columns]
```

Georgia

[482]:
```
georgia = full_state_data_revised[full_state_data_revised.State=='GA'].iloc[:,:]
display(georgia.head(5))
```

```
    State  2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  \
394    GA         74948         74948         74948         74948
395    GA          3558          3558          3560          3560
396    GA          1621          1621          1625          1625
397    GA          2666          2666          2671          2671
398    GA           316           316           316           316

     2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  \
394         74948         74948         74948         75312         75312
395          3560          3560          3560          3558          3558
396          1625          1625          1625          1619          1619
397          2671          2671          2671          2671          2671
398           316           316           316           317           317

     …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
394  …          1596          1596          1596          1596
395  …           135           135           135           135
396  …            54            54            54            54
397  …            81            81            81            81
398  …            15            15            15            15

     2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
394          1596          1596          1601          1601          1601
395           135           135           135           135           135
396            54            54            54            54            57
397            81            81            81            81            81
398            15            15            15            15            15
```

```
     2022-12-31_y
394          1601
395           135
396            57
397            81
398            15

[5 rows x 429 columns]
```

2.0.1 Converting Daily Data to Weekly Data

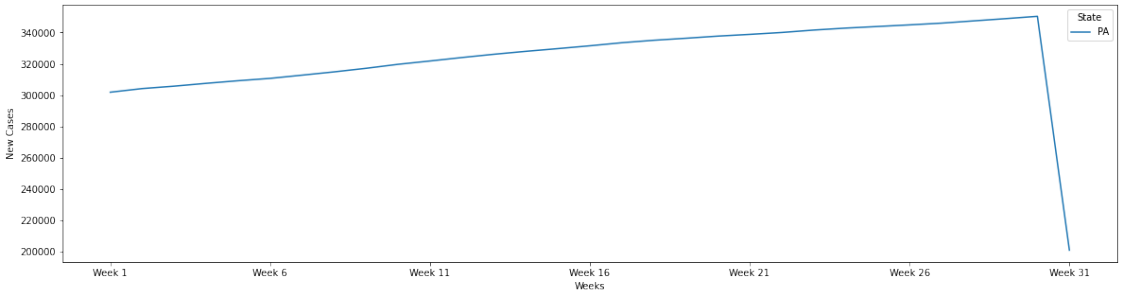
[483]:
```
#Pennsylvania's New Cases Mean
pa_mean = pd.DataFrame(pennsylvania.groupby('State').mean())
pa_new_cases_mean = pd.DataFrame(pa_mean.drop(pa_mean.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(pa_new_cases_mean)
pa_new_cases_mean = pa_new_cases_mean.groupby((np.arange(len(pa_new_cases_mean.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(pa_new_cases_mean)
pa_new_cases_mean.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
PA     43120.382353  43120.382353  43120.382353  43120.382353  43120.382353

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
PA     43120.382353  43120.382353  43452.205882  43452.205882  43452.205882

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
PA     …  50046.720588  50046.720588  50046.720588  50046.720588

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
PA     50046.720588  50046.720588  50237.382353  50237.382353  50237.382353

       2022-12-31_x
State
PA     50237.382353

[1 rows x 214 columns]
```

```
         Week 1    Week 2    Week 3    Week 4    Week 5    Week 6    Week 7  \
State
PA     301843.0  304165.0  305719.0  307522.0  309190.0  310690.0  312743.0

         Week 8    Week 9   Week 10  …   Week 22   Week 23   Week 24  \
```

```
State                                …
PA     314827.0  317120.0  319667.0  …  339999.0  341544.0  342800.0

        Week 25   Week 26   Week 27   Week 28   Week 29   Week 30   Week 31
State
PA     343825.0  344860.0  345964.0  347399.0  348823.0  350327.0  200950.0

[1 rows x 31 columns]
```

[483]: <Axes: xlabel='Weeks', ylabel='New Cases'>

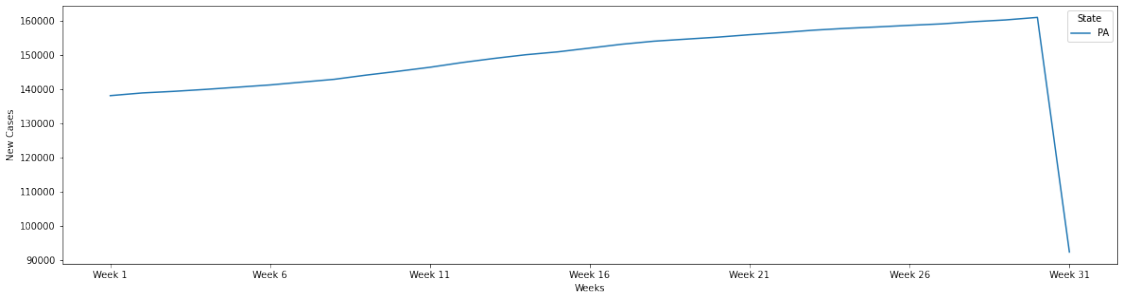


[484]:
```
#Pennsylvania's New Cases Median
pa_median = pd.DataFrame(pennsylvania.groupby('State').median())
pa_new_cases_median = pd.DataFrame(pa_median.drop(pa_median.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
display(pa_new_cases_median)
pa_new_cases_median = pa_new_cases_median.groupby((np.
 ↪arange(len(pa_new_cases_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(pa_new_cases_median)
pa_new_cases_median.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
PA          19719.5       19719.5       19719.5       19719.5       19719.5

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
PA          19719.5       19719.5       19832.5       19832.5       19832.5

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
PA     …       22988.5       22988.5       22988.5       22988.5

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
```

```
PA          22988.5       22988.5       23081.0       23081.0       23081.0

       2022-12-31_x
State
PA          23081.0

[1 rows x 214 columns]
         Week 1    Week 2    Week 3    Week 4    Week 5    Week 6    Week 7  \
State
PA     138036.0  138828.0  139304.0  139878.0  140520.0  141169.0  141995.0

         Week 8    Week 9   Week 10  …   Week 22   Week 23   Week 24  \
State                                 …
PA     142807.0  144036.0  145159.0  …  156482.0  157178.0  157710.0

         Week 25   Week 26   Week 27   Week 28   Week 29   Week 30  Week 31
State
PA     158130.0  158596.0  159016.0  159656.0  160167.0  160920.0  92324.0

[1 rows x 31 columns]
```

[484]: <Axes: xlabel='Weeks', ylabel='New Cases'>



[485]:
```
#Pennsylvania's New Cases Mode
pa_mode = pd.DataFrame(pennsylvania.groupby('State').mode())
pa_new_cases_mode = pd.DataFrame(pa_mode.drop(pa_mode.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(pa_new_cases_mode)
pa_new_cases_mode = pa_new_cases_mode.groupby((np.arange(len(pa_new_cases_mode.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(pa_new_cases_mode)
pa_new_cases_mode.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
```

```
<ipython-input-485-3bc92af55043> in <module>
      1 #Pennsylvania's New Cases Mode
----> 2 pa_mode = pd.DataFrame(pennsylvania.groupby('State').mode())
      3 pa_new_cases_mode = pd.DataFrame(pa_mode.drop(pa_mode.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
      4 display(pa_new_cases_mode)
      5 pa_new_cases_mode = pa_new_cases_mode.groupby((np.
 ↪arange(len(pa_new_cases_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')

/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

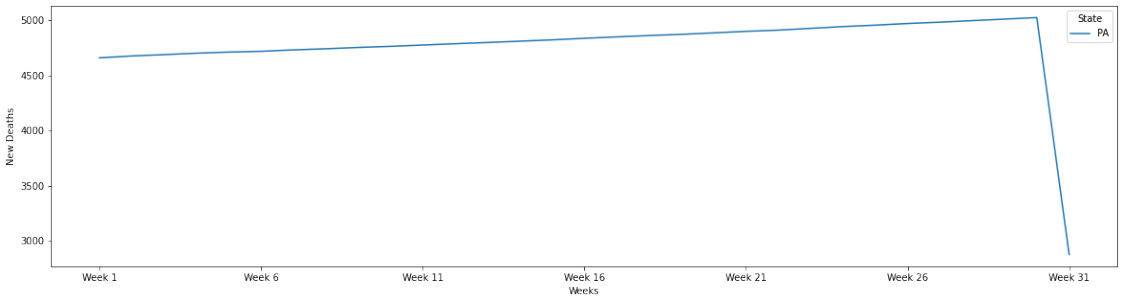
[486]:
```
#Pennsylvania's New Deaths Mean
pa_mean = pd.DataFrame(pennsylvania.groupby('State').mean())
pa_new_deaths_mean = pd.DataFrame(pa_mean.drop(pa_mean.loc[:, '2022-06-01_x':
 ↪'2022-12-31_x'].columns, axis=1))
display(pa_new_deaths_mean)
pa_new_deaths_mean = pa_new_deaths_mean.groupby((np.
 ↪arange(len(pa_new_deaths_mean.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(pa_new_deaths_mean)
pa_new_deaths_mean.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  2022-06-05_y  \
State
PA            665.5         665.5         665.5         665.5         665.5

       2022-06-06_y  2022-06-07_y  2022-06-08_y  2022-06-09_y  2022-06-10_y  \
State
PA            665.5         665.5    667.838235    667.838235    667.838235

       …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
State  …
PA     …    717.617647    717.617647    717.617647    717.617647

       2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
State
PA       717.617647    717.617647         719.0         719.0         719.0
```

```
       2022-12-31_y
State
PA            719.0

[1 rows x 214 columns]
```

```
       Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  \
State
PA     4658.0  4675.0  4687.0  4700.0  4710.0  4717.0  4730.0  4740.0  4752.0

       Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  Week 27  \
State           …
PA      4762.0  …   4909.0   4925.0   4941.0   4954.0   4969.0   4981.0

       Week 28  Week 29  Week 30  Week 31
State
PA      4995.0   5009.0   5023.0   2876.0

[1 rows x 31 columns]
```

[486]: <Axes: xlabel='Weeks', ylabel='New Deaths'>

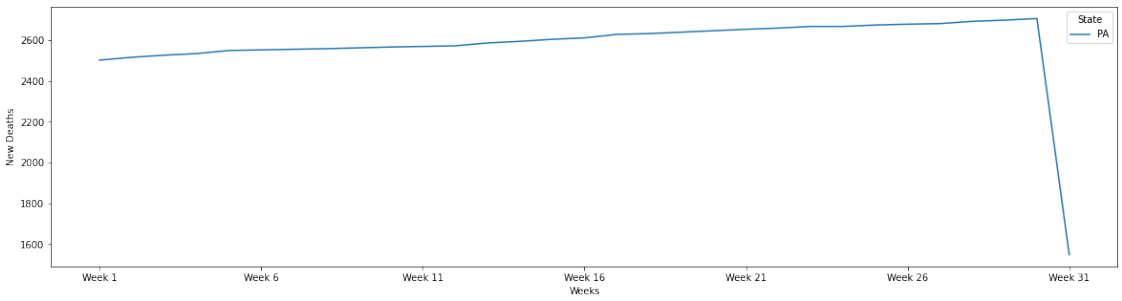


[487]:
```
#Pennsylvania's New Deaths Median
pa_median = pd.DataFrame(pennsylvania.groupby('State').median())
pa_new_deaths_median = pd.DataFrame(pa_median.drop(pa_median.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
display(pa_new_deaths_median)
pa_new_deaths_median = pa_new_deaths_median.groupby((np.
 ↪arange(len(pa_new_deaths_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(pa_new_deaths_median)
pa_new_deaths_median.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  2022-06-05_y  \
State
PA            357.5         357.5         357.5         357.5         357.5
```

```
       2022-06-06_y  2022-06-07_y  2022-06-08_y  2022-06-09_y  2022-06-10_y  \
State
PA            357.5         357.5         359.5         359.5         359.5

       …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
State  …
PA     …         386.5         386.5         386.5         386.5

       2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
State
PA            386.5         386.5         387.0         387.0         387.0

       2022-12-31_y
State
PA            387.0

[1 rows x 214 columns]
       Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  \
State
PA     2502.0  2516.0  2526.0  2534.0  2549.0  2552.0  2555.0  2558.0  2562.0

       Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  Week 27  \
State           …
PA      2566.0  …   2659.0   2667.0   2667.0   2674.0   2678.0   2681.0

       Week 28  Week 29  Week 30  Week 31
State
PA      2692.0   2698.0   2706.0   1548.0

[1 rows x 31 columns]
```

[487]: `<Axes: xlabel='Weeks', ylabel='New Deaths'>`



[488]:
```
#Pennsylvania's New Deaths Mode
pa_mode = pd.DataFrame(pennsylvania.groupby('State').mode())
```

```
pa_new_cases_mode = pd.DataFrame(pa_mode.drop(pa_mode.loc[:, '2022-06-01_x':
 ↪'2022-12-31_x'].columns, axis=1))
display(pa_new_cases_mode)
pa_new_cases_mode = pa_new_cases_mode.groupby((np.arange(len(pa_new_cases_mode.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(pa_new_cases_mode)
pa_new_cases_mode.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

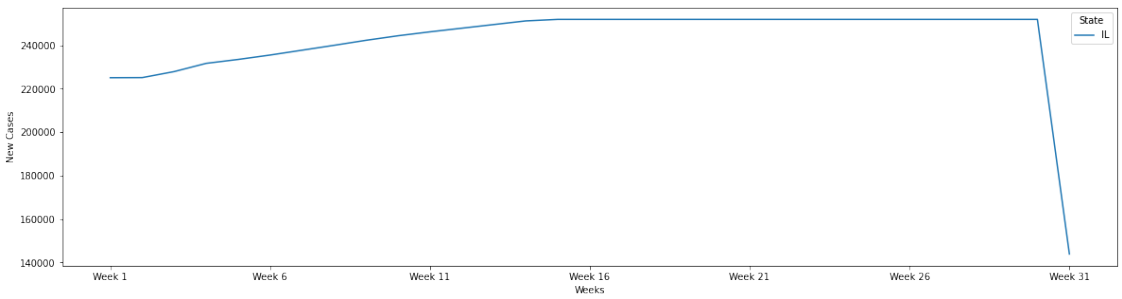
```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-488-b4089cb52d39> in <module>
      1 #Pennsylvania's New Deaths Mode
----> 2 pa_mode = pd.DataFrame(pennsylvania.groupby('State').mode())
      3 pa_new_cases_mode = pd.DataFrame(pa_mode.drop(pa_mode.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
      4 display(pa_new_cases_mode)
      5 pa_new_cases_mode = pa_new_cases_mode.groupby((np.
 ↪arange(len(pa_new_cases_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')

/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

[489]:
```
# Illinois's New Cases Mean
il_mean = pd.DataFrame(illinois.groupby('State').mean())
il_new_cases_mean = pd.DataFrame(il_mean.drop(il_mean.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(il_new_cases_mean)
il_new_cases_mean = il_new_cases_mean.groupby((np.arange(len(il_new_cases_mean.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(il_new_cases_mean)
il_new_cases_mean.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
IL     32106.262136  32156.815534  32156.815534  32156.815534  32156.815534

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
```

```
IL     32156.815534  32156.815534  32156.815534  32156.815534  32156.815534

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
IL     …  35983.135922  35983.135922  35983.135922  35983.135922

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
IL     35983.135922  35983.135922  35983.135922  35983.135922  35983.135922

       2022-12-31_x
State
IL     35983.135922

[1 rows x 214 columns]
         Week 1    Week 2    Week 3    Week 4    Week 5    Week 6    Week 7  \
State
IL     225047.0  225098.0  227867.0  231648.0  233444.0  235476.0  237707.0

         Week 8    Week 9   Week 10  …   Week 22   Week 23   Week 24  \
State                                 …
IL     239952.0  242254.0  244347.0  …  251882.0  251882.0  251882.0

        Week 25   Week 26   Week 27   Week 28   Week 29   Week 30   Week 31
State
IL     251882.0  251882.0  251882.0  251882.0  251882.0  251882.0  143933.0

[1 rows x 31 columns]
```

[489]: `<Axes: xlabel='Weeks', ylabel='New Cases'>`

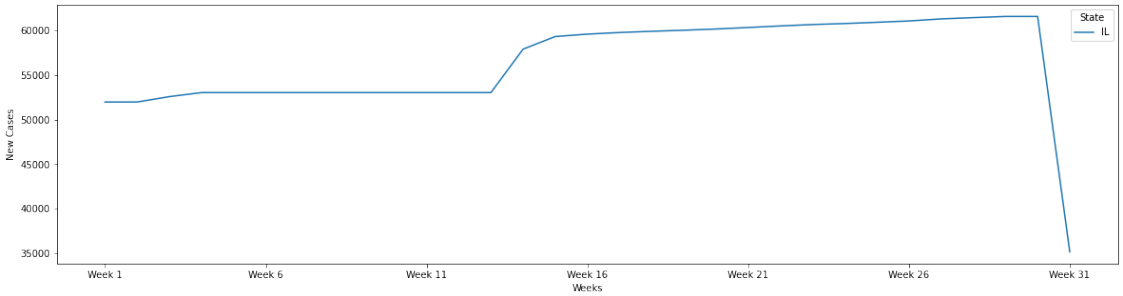


[490]:
```
# Illinois's New Cases Median
il_median = pd.DataFrame(illinois.groupby('State').median())
il_new_cases_median = pd.DataFrame(il_median.drop(il_median.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
```

```
display(il_new_cases_median)
il_new_cases_median = il_new_cases_median.groupby((np.
 ↪arange(len(il_new_cases_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(il_new_cases_median)
il_new_cases_median.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
IL           7418.0        7423.0        7423.0        7423.0        7423.0

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
IL           7423.0        7423.0        7423.0        7423.0        7423.0

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
IL     …        8793.0        8793.0        8793.0        8793.0

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
IL           8793.0        8793.0        8793.0        8793.0        8793.0

       2022-12-31_x
State
IL           8793.0

[1 rows x 214 columns]
        Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Week 7   Week 8  \
State
IL     51956.0  51961.0  52565.0  53018.0  53018.0  53018.0  53018.0  53018.0

        Week 9  Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  \
State                    …
IL     53018.0  53018.0  …  60485.0  60644.0  60754.0  60894.0  61043.0

       Week 27  Week 28  Week 29  Week 30  Week 31
State
IL     61274.0  61418.0  61551.0  61551.0  35172.0

[1 rows x 31 columns]
```

[490]: <Axes: xlabel='Weeks', ylabel='New Cases'>



[491]:
```
# Illinois's New Cases Mode
il_mode = pd.DataFrame(illinois.groupby('State').mode())
il_new_cases_mode = pd.DataFrame(il_mode.drop(il_mode.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(il_new_cases_mode)
il_new_cases_mode = il_new_cases_mode.groupby((np.arange(len(il_new_cases_mode.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(il_new_cases_mode)
il_new_cases_mode.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-491-4bcaba0a3f0d> in <module>
      1 # Illinois's New Cases Mode
----> 2 il_mode = pd.DataFrame(illinois.groupby('State').mode())
      3 il_new_cases_mode = pd.DataFrame(il_mode.drop(il_mode.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
      4 display(il_new_cases_mode)
      5 il_new_cases_mode = il_new_cases_mode.groupby((np.
 ↪arange(len(il_new_cases_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')

/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

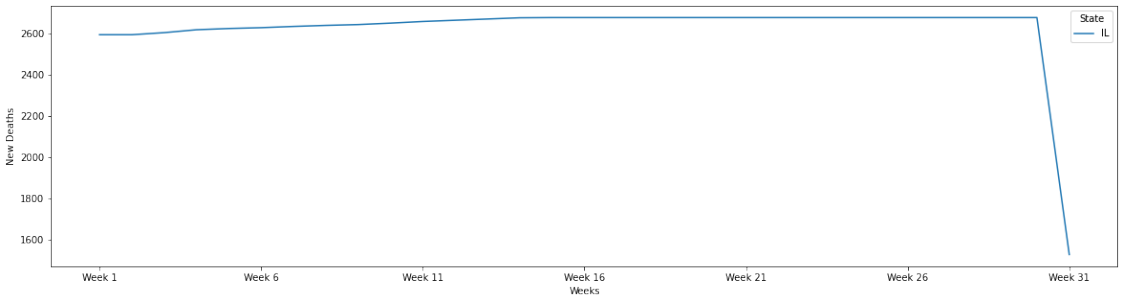
[492]:
```
# Illinois's New Deaths Mean
il_mean = pd.DataFrame(illinois.groupby('State').mean())
```

```
il_new_deaths_mean = pd.DataFrame(il_mean.drop(il_mean.loc[:, '2022-06-01_x':
 ↪'2022-12-31_x'].columns, axis=1))
display(il_new_deaths_mean)
il_new_deaths_mean = il_new_deaths_mean.groupby((np.
 ↪arange(len(il_new_deaths_mean.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(il_new_deaths_mean)
il_new_deaths_mean.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  2022-06-05_y  \
State
IL       370.495146    370.495146    370.495146    370.495146    370.495146

       2022-06-06_y  2022-06-07_y  2022-06-08_y  2022-06-09_y  2022-06-10_y  \
State
IL       370.495146    370.495146    370.495146    370.495146    370.495146

       …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
State  …
IL     …    382.339806    382.339806    382.339806    382.339806

       2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
State
IL       382.339806    382.339806    382.339806    382.339806    382.339806

       2022-12-31_y
State
IL       382.339806

[1 rows x 214 columns]
```

```
       Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  \
State
IL     2593.0  2593.0  2603.0  2617.0  2623.0  2627.0  2633.0  2638.0  2642.0

       Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  Week 27  \
State           …
IL      2649.0  …   2676.0   2676.0   2676.0   2676.0   2676.0   2676.0

       Week 28  Week 29  Week 30  Week 31
State
IL      2676.0   2676.0   2676.0   1529.0

[1 rows x 31 columns]
```

```
[492]: <Axes: xlabel='Weeks', ylabel='New Deaths'>
```



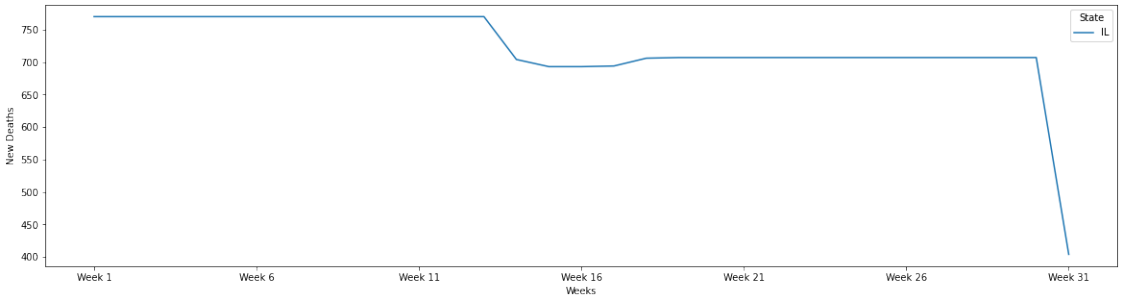
[493]:
```
# Illinois's New Deaths Median
il_median = pd.DataFrame(illinois.groupby('State').median())
il_new_deaths_median = pd.DataFrame(il_median.drop(il_median.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
display(il_new_deaths_median)
il_new_deaths_median = il_new_deaths_median.groupby((np.
 ↪arange(len(il_new_deaths_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(il_new_deaths_median)
il_new_deaths_median.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  2022-06-05_y  \
State
IL            110.0         110.0         110.0         110.0         110.0

       2022-06-06_y  2022-06-07_y  2022-06-08_y  2022-06-09_y  2022-06-10_y  \
State
IL            110.0         110.0         110.0         110.0         110.0

       …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
State  …
IL     …         101.0         101.0         101.0         101.0

       2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
State
IL            101.0         101.0         101.0         101.0         101.0

       2022-12-31_y
State
IL            101.0

[1 rows x 214 columns]
```

```
       Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  \
State
IL      770.0   770.0   770.0   770.0   770.0   770.0   770.0   770.0   770.0
```

```
       Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  Week 27  \
State           …
IL       770.0  …    707.0    707.0    707.0    707.0    707.0    707.0

       Week 28  Week 29  Week 30  Week 31
State
IL       707.0    707.0    707.0    404.0

[1 rows x 31 columns]
```

[493]: `<Axes: xlabel='Weeks', ylabel='New Deaths'>`



[494]:
```
# Illinois's New Deaths Mode
il_mode = pd.DataFrame(illinois.groupby('State').mode())
il_new_deaths_mode = pd.DataFrame(il_mode.drop(il_mode.loc[:, '2022-06-01_x':
 ↪'2022-12-31_x'].columns, axis=1))
display(il_new_deaths_mode)
il_new_deaths_mode = il_new_deaths_mode.groupby((np.
 ↪arange(len(il_new_deaths_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(il_new_deaths_mode)
il_new_deaths_mode.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-494-267335b87627> in <module>
      1 # Illinois's New Deaths Mode
----> 2 il_mode = pd.DataFrame(illinois.groupby('State').mode())
      3 il_new_deaths_mode = pd.DataFrame(il_mode.drop(il_mode.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
      4 display(il_new_deaths_mode)
      5 il_new_deaths_mode = il_new_deaths_mode.groupby((np.
 ↪arange(len(il_new_deaths_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
```

```
/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

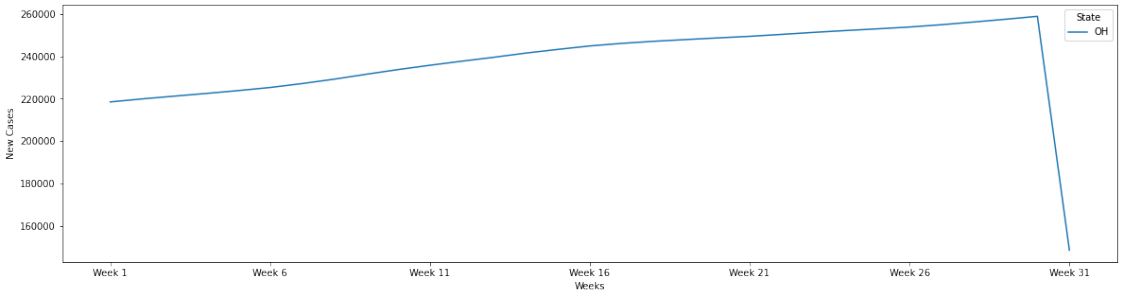
[495]:
```
# Ohio's New Cases Mean
oh_mean = pd.DataFrame(ohio.groupby('State').mean())
oh_new_cases_mean = pd.DataFrame(oh_mean.drop(oh_mean.loc[:, '2022-06-01_y':
↪'2022-12-31_y'].columns, axis=1))
display(oh_new_cases_mean)
oh_new_cases_mean = oh_new_cases_mean.groupby((np.arange(len(oh_new_cases_mean.
↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(oh_new_cases_mean)
oh_new_cases_mean.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
OH     31046.325843  31243.292135  31243.292135  31243.292135  31243.292135

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
OH     31243.292135  31243.292135  31243.292135  31448.314607  31448.314607

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
OH     …  37017.089888  37017.089888  37017.089888  37017.089888

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
OH     37017.089888  37017.089888  37017.089888  37163.685393  37163.685393

       2022-12-31_x
State
OH     37163.685393

[1 rows x 214 columns]
```

```
         Week 1    Week 2    Week 3    Week 4    Week 5    Week 6    Week 7  \
State
OH     218506.0  219933.0  221228.0  222499.0  223842.0  225306.0  227167.0

         Week 8    Week 9   Week 10  …   Week 22   Week 23   Week 24  \
```

```
State                                …
OH     229235.0  231549.0  233757.0  …  250378.0  251335.0  252206.0

        Week 25   Week 26   Week 27   Week 28   Week 29   Week 30   Week 31
State
OH     253013.0  253869.0  254953.0  256217.0  257525.0  258919.0  148508.0

[1 rows x 31 columns]
```

[495]: <Axes: xlabel='Weeks', ylabel='New Cases'>

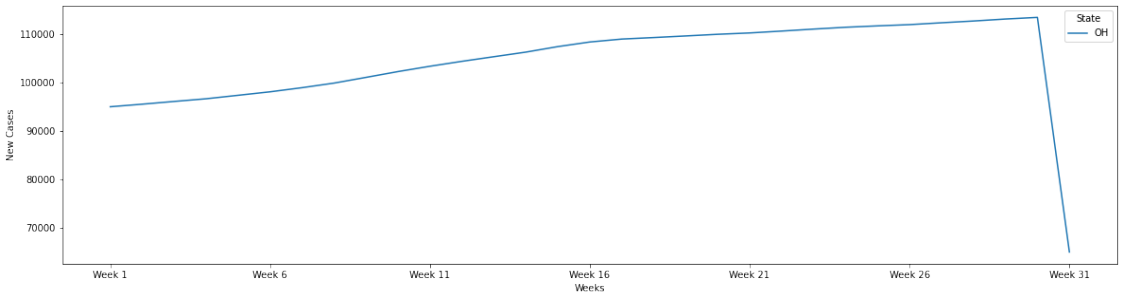


[496]:
```
# Ohio's New Cases Median
oh_median = pd.DataFrame(ohio.groupby('State').median())
oh_new_cases_median = pd.DataFrame(oh_median.drop(oh_median.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
display(oh_new_cases_median)
oh_new_cases_median = oh_new_cases_median.groupby((np.
 ↪arange(len(oh_new_cases_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(oh_new_cases_median)
oh_new_cases_median.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
OH          13515.0       13573.0       13573.0       13573.0       13573.0

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
OH          13573.0       13573.0       13573.0       13652.0       13652.0

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
OH     …       16211.0       16211.0       16211.0       16211.0

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
```

```
OH          16211.0       16211.0       16211.0       16237.0       16237.0

       2022-12-31_x
State
OH          16237.0

[1 rows x 214 columns]
        Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Week 7   Week 8  \
State
OH     94953.0  95485.0  96050.0  96605.0  97320.0  98044.0  98897.0  99844.0

         Week 9   Week 10  …   Week 22   Week 23   Week 24   Week 25  \
State                      …
OH     101025.0  102225.0  …  110599.0  111010.0  111387.0  111674.0

        Week 26   Week 27   Week 28   Week 29   Week 30  Week 31
State
OH     111930.0  112314.0  112678.0  113088.0  113430.0  64922.0

[1 rows x 31 columns]
```

[496]: <Axes: xlabel='Weeks', ylabel='New Cases'>



[497]:
```
# Ohio's New Cases Mode
oh_mode = pd.DataFrame(ohio.groupby('State').mode())
oh_new_cases_mode = pd.DataFrame(oh_mode.drop(oh_mode.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(oh_new_cases_mode)
oh_new_cases_mode = oh_new_cases_mode.groupby((np.arange(len(oh_new_cases_mode.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(oh_new_cases_mode)
oh_new_cases_mode.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
```

```
<ipython-input-497-1c9ed2488923> in <module>
      1 # Ohio's New Cases Mode
----> 2 oh_mode = pd.DataFrame(ohio.groupby('State').mode())
      3 oh_new_cases_mode = pd.DataFrame(oh_mode.drop(oh_mode.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
      4 display(oh_new_cases_mode)
      5 oh_new_cases_mode = oh_new_cases_mode.groupby((np.
 ↪arange(len(oh_new_cases_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')

/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

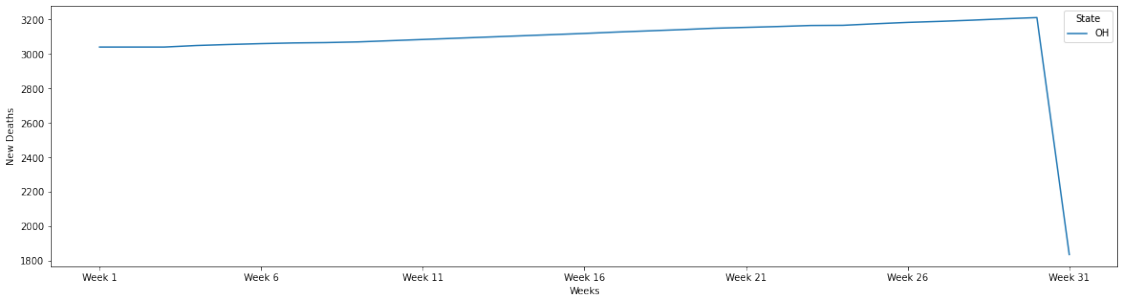
[498]:
```
# Ohio's New Deaths Mean
oh_mean = pd.DataFrame(ohio.groupby('State').mean())
oh_new_deaths_mean = pd.DataFrame(oh_mean.drop(oh_mean.loc[:, '2022-06-01_x':
 ↪'2022-12-31_x'].columns, axis=1))
display(oh_new_deaths_mean)
oh_new_deaths_mean = oh_new_deaths_mean.groupby((np.
 ↪arange(len(oh_new_deaths_mean.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(oh_new_deaths_mean)
oh_new_deaths_mean.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  2022-06-05_y  \
State
OH       434.022472    434.348315    434.348315    434.348315    434.348315

       2022-06-06_y  2022-06-07_y  2022-06-08_y  2022-06-09_y  2022-06-10_y  \
State
OH       434.348315    434.348315    434.348315    434.348315    434.348315

       …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
State  …
OH     …    458.876404    458.876404    458.876404    458.876404

       2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
State
OH       458.876404    458.876404    458.876404    459.865169    459.865169
```

```
       2022-12-31_y
State
OH       459.865169

[1 rows x 214 columns]
```

```
       Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  \
State
OH     3040.0  3040.0  3040.0  3049.0  3055.0  3060.0  3064.0  3066.0  3070.0

       Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  Week 27  \
State           …
OH      3077.0  …   3159.0   3165.0   3166.0   3175.0   3183.0   3189.0

       Week 28  Week 29  Week 30  Week 31
State
OH      3196.0   3204.0   3211.0   1838.0

[1 rows x 31 columns]
```

[498]: <Axes: xlabel='Weeks', ylabel='New Deaths'>



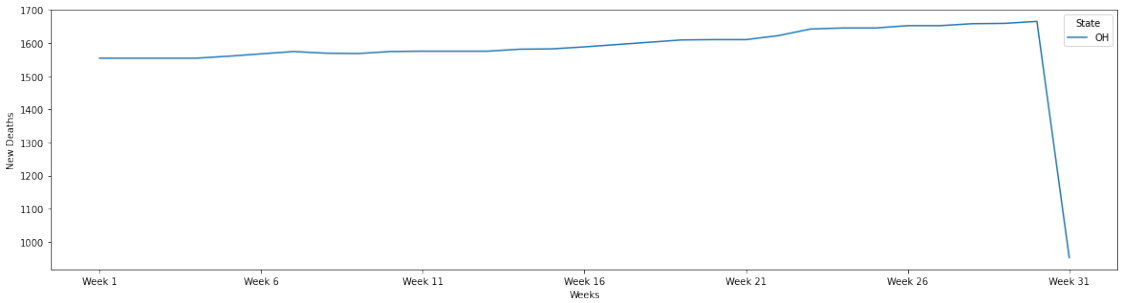
[499]:
```
# Ohio's New Deaths Median
oh_median = pd.DataFrame(ohio.groupby('State').median())
oh_new_deaths_median = pd.DataFrame(oh_median.drop(oh_median.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
display(oh_new_deaths_median)
oh_new_deaths_median = oh_new_deaths_median.groupby((np.
 ↪arange(len(oh_new_deaths_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(oh_new_deaths_median)
oh_new_deaths_median.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  2022-06-05_y  \
State
OH            222.0         222.0         222.0         222.0         222.0
```

```
       2022-06-06_y  2022-06-07_y  2022-06-08_y  2022-06-09_y  2022-06-10_y  \
State
OH            222.0         222.0         222.0         222.0         222.0

       …  2022-12-22_y  2022-12-23_y  2022-12-24_y  2022-12-25_y  \
State  …
OH     …         238.0         238.0         238.0         238.0

       2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
State
OH            238.0         238.0         238.0         238.0         238.0

       2022-12-31_y
State
OH            238.0

[1 rows x 214 columns]
```

```
       Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  \
State
OH     1554.0  1554.0  1554.0  1554.0  1560.0  1567.0  1574.0  1569.0  1568.0

       Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  Week 27  \
State           …
OH      1574.0  …   1622.0   1642.0   1645.0   1645.0   1652.0   1652.0

       Week 28  Week 29  Week 30  Week 31
State
OH      1658.0   1659.0   1665.0    952.0

[1 rows x 31 columns]
```

[499]: <Axes: xlabel='Weeks', ylabel='New Deaths'>



[500]:
```
# Ohio's New Deaths Mode
oh_mode = pd.DataFrame(ohio.groupby('State').mode())
```

```
oh_new_deaths_mode = pd.DataFrame(oh_mode.drop(oh_mode.loc[:, '2022-06-01_x':
 ↪'2022-12-31_x'].columns, axis=1))
display(oh_new_deaths_mode)
oh_new_deaths_mode = oh_new_deaths_mode.groupby((np.
 ↪arange(len(oh_new_deaths_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(oh_new_deaths_mode)
oh_new_deaths_mode.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

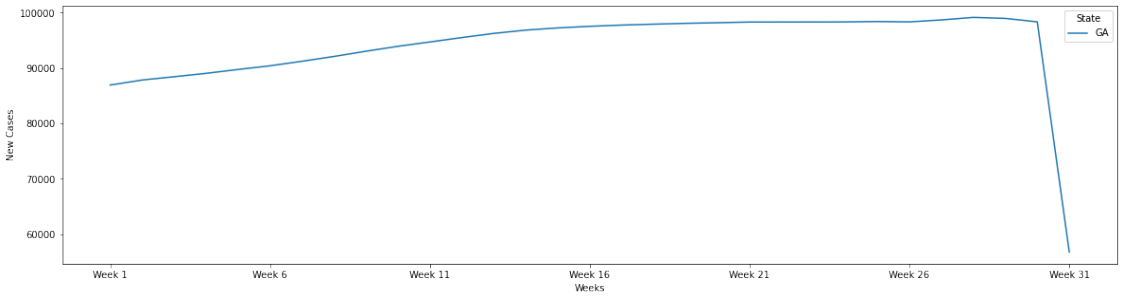
```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-500-3ab2998df6b4> in <module>
      1 # Ohio's New Deaths Mode
----> 2 oh_mode = pd.DataFrame(ohio.groupby('State').mode())
      3 oh_new_deaths_mode = pd.DataFrame(oh_mode.drop(oh_mode.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
      4 display(oh_new_deaths_mode)
      5 oh_new_deaths_mode = oh_new_deaths_mode.groupby((np.
 ↪arange(len(oh_new_deaths_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')

/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

[501]:
```
# Georgia's New Cases Mean
ga_mean = pd.DataFrame(georgia.groupby('State').mean())
ga_new_cases_mean = pd.DataFrame(ga_mean.drop(ga_mean.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(ga_new_cases_mean)
ga_new_cases_mean = ga_new_cases_mean.groupby((np.arange(len(ga_new_cases_mean.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(ga_new_cases_mean)
ga_new_cases_mean.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
GA      12323.91875   12323.91875    12456.0875    12456.0875    12456.0875

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
```

```
State
GA       12456.0875    12456.0875    12547.59375    12547.59375    12547.59375

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
GA     …    14046.5875    14046.5875    14046.5875    14046.5875

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
GA       14046.5875    14046.5875    14046.24375    14046.24375    14357.7125

       2022-12-31_x
State
GA       14357.7125

[1 rows x 214 columns]
        Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Week 7   Week 8  \
State
GA     86928.0  87833.0  88427.0  89039.0  89736.0  90400.0  91220.0  92084.0

        Week 9  Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  \
State                    …
GA     93030.0  93916.0  …  98296.0  98301.0  98314.0  98387.0  98322.0

       Week 27  Week 28  Week 29  Week 30  Week 31
State
GA     98672.0  99136.0  98950.0  98326.0  56808.0

[1 rows x 31 columns]
```

[501]: `<Axes: xlabel='Weeks', ylabel='New Cases'>`



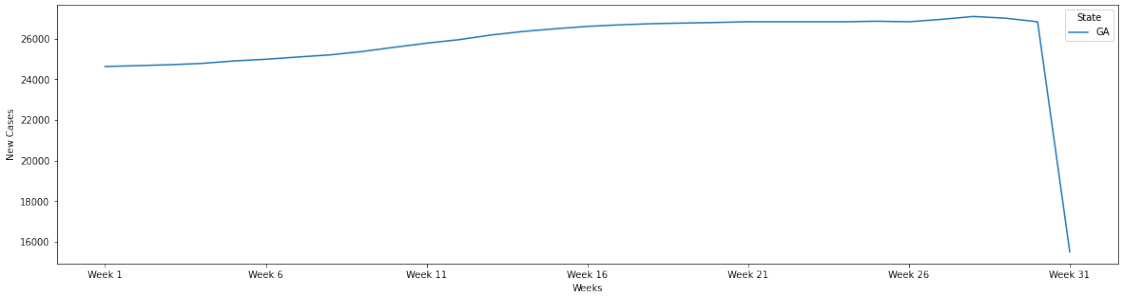
[502]:
```
# Georgia's New Cases Median
ga_median = pd.DataFrame(georgia.groupby('State').median())
```

```
ga_new_cases_median = pd.DataFrame(ga_median.drop(ga_median.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
display(ga_new_cases_median)
ga_new_cases_median = ga_new_cases_median.groupby((np.
 ↪arange(len(ga_new_cases_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(ga_new_cases_median)
ga_new_cases_median.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
GA           3511.5        3511.5        3521.5        3521.5        3521.5

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
GA           3521.5        3521.5        3524.5        3524.5        3524.5

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
GA     …        3833.0        3833.0        3833.0        3833.0

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
GA           3833.0        3833.0        3833.0        3833.0        3922.5

       2022-12-31_x
State
GA           3922.5

[1 rows x 214 columns]
```

```
        Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Week 7   Week 8  \
State
GA     24630.0  24672.0  24717.0  24780.0  24902.0  24986.0  25098.0  25204.0

        Week 9  Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  \
State                    …
GA     25368.0  25578.0  …  26831.0  26831.0  26831.0  26858.0  26831.0

       Week 27  Week 28  Week 29  Week 30  Week 31
State
GA     26948.0  27094.0  27008.0  26831.0  15511.0

[1 rows x 31 columns]
```

```
[502]: <Axes: xlabel='Weeks', ylabel='New Cases'>
```



[503]:
```
# Georgia's New Cases Mode
ga_mode = pd.DataFrame(georgia.groupby('State').mode())
ga_new_cases_mode = pd.DataFrame(ga_mode.drop(ga_mode.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(ga_new_cases_mode)
ga_new_cases_mode = ga_new_cases_mode.groupby((np.arange(len(ga_new_cases_mode.
 ↪columns)) // 7) + 1, axis=1).sum().round().add_prefix('Week ')
display(ga_new_cases_mode)
ga_new_cases_mode.T.plot(xlabel='Weeks', ylabel='New Cases',figsize=(20,5))
```

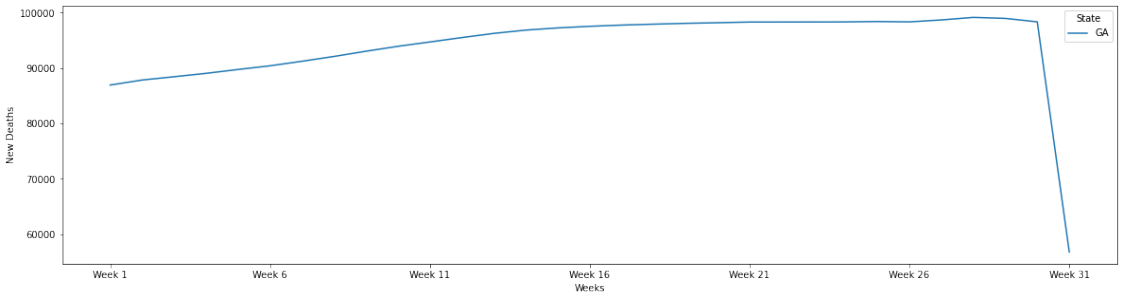
```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-503-e4894285972f> in <module>
      1 # Georgia's New Cases Mode
----> 2 ga_mode = pd.DataFrame(georgia.groupby('State').mode())
      3 ga_new_cases_mode = pd.DataFrame(ga_mode.drop(ga_mode.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
      4 display(ga_new_cases_mode)
      5 ga_new_cases_mode = ga_new_cases_mode.groupby((np.
 ↪arange(len(ga_new_cases_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')

/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

[504]:
```
# Georgia's New Deaths Mean
ga_mean = pd.DataFrame(georgia.groupby('State').mean())
```

```
ga_new_deaths_mean = pd.DataFrame(ga_mean.drop(ga_mean.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(ga_new_deaths_mean)
ga_new_deaths_mean = ga_new_deaths_mean.groupby((np.
 ↪arange(len(ga_new_deaths_mean.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(ga_new_deaths_mean)
ga_new_deaths_mean.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
GA      12323.91875   12323.91875    12456.0875    12456.0875    12456.0875

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
GA       12456.0875    12456.0875   12547.59375   12547.59375   12547.59375

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
GA     …    14046.5875    14046.5875    14046.5875    14046.5875

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
GA       14046.5875    14046.5875   14046.24375   14046.24375    14357.7125

       2022-12-31_x
State
GA       14357.7125

[1 rows x 214 columns]
        Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Week 7   Week 8  \
State
GA     86928.0  87833.0  88427.0  89039.0  89736.0  90400.0  91220.0  92084.0

        Week 9  Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  \
State                    …
GA     93030.0  93916.0  …  98296.0  98301.0  98314.0  98387.0  98322.0

       Week 27  Week 28  Week 29  Week 30  Week 31
State
GA     98672.0  99136.0  98950.0  98326.0  56808.0

[1 rows x 31 columns]
```

```
[504]: <Axes: xlabel='Weeks', ylabel='New Deaths'>
```



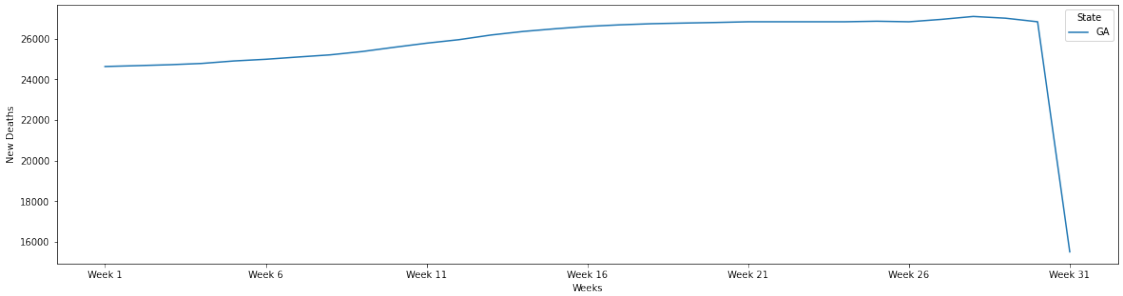
[505]:
```
# Georgia's New Deaths Median
ga_median = pd.DataFrame(georgia.groupby('State').median())
ga_new_deaths_median = pd.DataFrame(ga_median.drop(ga_median.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
display(ga_new_deaths_median)
ga_new_deaths_median = ga_new_deaths_median.groupby((np.
 ↪arange(len(ga_new_deaths_median.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(ga_new_deaths_median)
ga_new_deaths_median.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
       2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  2022-06-05_x  \
State
GA           3511.5        3511.5        3521.5        3521.5        3521.5

       2022-06-06_x  2022-06-07_x  2022-06-08_x  2022-06-09_x  2022-06-10_x  \
State
GA           3521.5        3521.5        3524.5        3524.5        3524.5

       …  2022-12-22_x  2022-12-23_x  2022-12-24_x  2022-12-25_x  \
State  …
GA     …        3833.0        3833.0        3833.0        3833.0

       2022-12-26_x  2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
State
GA           3833.0        3833.0        3833.0        3833.0        3922.5

       2022-12-31_x
State
GA           3922.5

[1 rows x 214 columns]
```

```
        Week 1   Week 2   Week 3   Week 4   Week 5   Week 6   Week 7   Week 8  \
State
GA     24630.0  24672.0  24717.0  24780.0  24902.0  24986.0  25098.0  25204.0
```

```
          Week 9  Week 10  …  Week 22  Week 23  Week 24  Week 25  Week 26  \
State                      …
GA      25368.0  25578.0  …  26831.0  26831.0  26831.0  26858.0  26831.0

        Week 27  Week 28  Week 29  Week 30  Week 31
State
GA      26948.0  27094.0  27008.0  26831.0  15511.0

[1 rows x 31 columns]
```

[505]:
```
<Axes: xlabel='Weeks', ylabel='New Deaths'>
```



[506]:
```
# Georgia's New Deaths Mode
ga_mode = pd.DataFrame(georgia.groupby('State').mode())
ga_new_deaths_mode = pd.DataFrame(ga_mode.drop(ga_mode.loc[:, '2022-06-01_y':
 ↪'2022-12-31_y'].columns, axis=1))
display(ga_new_deaths_mode)
ga_new_deaths_mode = ga_new_deaths_mode.groupby((np.
 ↪arange(len(ga_new_deaths_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
display(ga_new_deaths_mode)
ga_new_deaths_mode.T.plot(xlabel='Weeks', ylabel='New Deaths',figsize=(20,5))
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-506-e743402f3d00> in <module>
      1 # Georgia's New Deaths Mode
----> 2 ga_mode = pd.DataFrame(georgia.groupby('State').mode())
      3 ga_new_deaths_mode = pd.DataFrame(ga_mode.drop(ga_mode.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
      4 display(ga_new_deaths_mode)
      5 ga_new_deaths_mode = ga_new_deaths_mode.groupby((np.
 ↪arange(len(ga_new_deaths_mode.columns)) // 7) + 1, axis=1).sum().round().
 ↪add_prefix('Week ')
```

```
/opt/conda/lib/python3.8/site-packages/pandas/core/groupby/groupby.py in␣
 ↪__getattr__(self, attr)
    985             return self[attr]
    986
--> 987         raise AttributeError(
    988             f"'{type(self).__name__}' object has no attribute '{attr}'"
    989         )

AttributeError: 'DataFrameGroupBy' object has no attribute 'mode'
```

3 Comparing With Other States

[507]:
```
# All states new cases comparison
all_new_cases = pd.concat([pa_new_cases_mean, il_new_cases_mean,␣
 ↪oh_new_cases_mean, ga_new_cases_mean], axis = 0)
display(all_new_cases)
all_new_cases.T.plot(figsize = (20,5), xlabel = 'Weeks', ylabel =␣
 ↪'new_cases_mean')
```

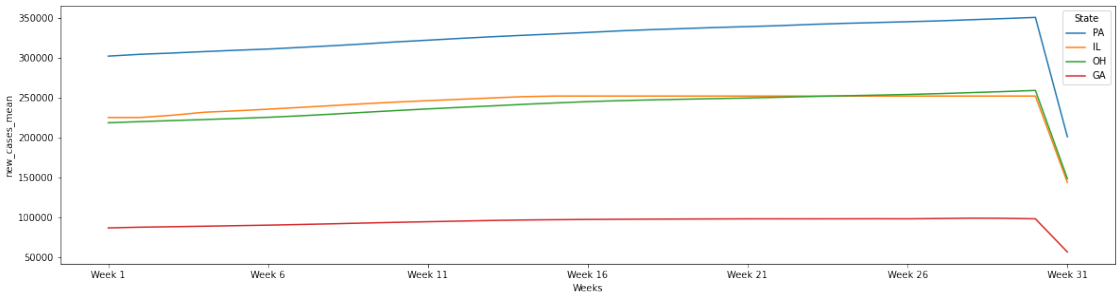
State	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	\
PA	301843.0	304165.0	305719.0	307522.0	309190.0	310690.0	312743.0	
IL	225047.0	225098.0	227867.0	231648.0	233444.0	235476.0	237707.0	
OH	218506.0	219933.0	221228.0	222499.0	223842.0	225306.0	227167.0	
GA	86928.0	87833.0	88427.0	89039.0	89736.0	90400.0	91220.0	

State	Week 8	Week 9	Week 10	…	Week 22	Week 23	Week 24	\
				…				
PA	314827.0	317120.0	319667.0	…	339999.0	341544.0	342800.0	
IL	239952.0	242254.0	244347.0	…	251882.0	251882.0	251882.0	
OH	229235.0	231549.0	233757.0	…	250378.0	251335.0	252206.0	
GA	92084.0	93030.0	93916.0	…	98296.0	98301.0	98314.0	

State	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31
PA	343825.0	344860.0	345964.0	347399.0	348823.0	350327.0	200950.0
IL	251882.0	251882.0	251882.0	251882.0	251882.0	251882.0	143933.0
OH	253013.0	253869.0	254953.0	256217.0	257525.0	258919.0	148508.0
GA	98387.0	98322.0	98672.0	99136.0	98950.0	98326.0	56808.0

[4 rows x 31 columns]

[507]: <Axes: xlabel='Weeks', ylabel='new_cases_mean'>



[508]:
```
# All states new deaths comparison
all_new_deaths = pd.concat([pa_new_deaths_mean, il_new_deaths_mean,␣
 ↪oh_new_deaths_mean, ga_new_deaths_mean], axis = 0)
display(all_new_deaths)
all_new_deaths.T.plot(figsize = (20,5), xlabel = 'Weeks', ylabel =␣
 ↪'new_deaths_mean')
```

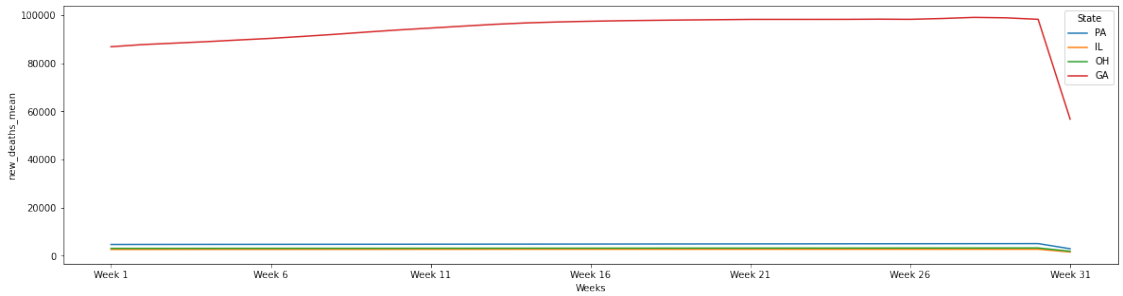
State	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	\
PA	4658.0	4675.0	4687.0	4700.0	4710.0	4717.0	4730.0	4740.0	
IL	2593.0	2593.0	2603.0	2617.0	2623.0	2627.0	2633.0	2638.0	
OH	3040.0	3040.0	3040.0	3049.0	3055.0	3060.0	3064.0	3066.0	
GA	86928.0	87833.0	88427.0	89039.0	89736.0	90400.0	91220.0	92084.0	

State	Week 9	Week 10	…	Week 22	Week 23	Week 24	Week 25	Week 26	\
PA	4752.0	4762.0	…	4909.0	4925.0	4941.0	4954.0	4969.0	
IL	2642.0	2649.0	…	2676.0	2676.0	2676.0	2676.0	2676.0	
OH	3070.0	3077.0	…	3159.0	3165.0	3166.0	3175.0	3183.0	
GA	93030.0	93916.0	…	98296.0	98301.0	98314.0	98387.0	98322.0	

State	Week 27	Week 28	Week 29	Week 30	Week 31
PA	4981.0	4995.0	5009.0	5023.0	2876.0
IL	2676.0	2676.0	2676.0	2676.0	1529.0
OH	3189.0	3196.0	3204.0	3211.0	1838.0
GA	98672.0	99136.0	98950.0	98326.0	56808.0

[4 rows x 31 columns]

[508]: <Axes: xlabel='Weeks', ylabel='new_deaths_mean'>



4 County data for Pennsylvania

[509]:
```
orginal_data = pd.read_csv("covid19_superdata.csv")
counties = orginal_data[orginal_data.State=='PA'].iloc[:,:]
pa_county_1 = counties[counties['County Name']=='philadelphia county']
pa_county_2 = counties[counties['County Name']=='allegheny county']
pa_county_3 = counties[counties['County Name']=='montgomery county']
counties = pd.concat([pa_county_1, pa_county_2, pa_county_3], axis = 0)
display(counties)
```

```
      countyFIPS          County Name State  StateFIPS  2020-01-22_x  \
2329       42101  philadelphia county    PA         42             0
2280       42003     allegheny county    PA         42             0
2324       42091    montgomery county    PA         42             0

      2020-01-23_x  2020-01-24_x  2020-01-25_x  2020-01-26_x  2020-01-27_x  \
2329             0             0             0             0             0
2280             0             0             0             0             0
2324             0             0             0             0             0

      …  2023-01-28_y  2023-01-29_y  2023-01-30_y  2023-01-31_y  \
2329  …          5475          5475          5475          5475
2280  …          3764          3764          3764          3764
2324  …          2606          2606          2606          2606

      2023-02-01_y  2023-02-02_y  2023-02-03_y  2023-02-04_y  2023-02-05_y  \
2329          5491          5491          5491          5491          5491
2280          3781          3781          3781          3781          3781
2324          2619          2619          2619          2619          2619

      population
2329     1584064
2280     1216045
2324      830915
```

```
[3 rows x 2227 columns]
```

[510]:
```
counties = counties.drop(counties.loc[:, :'countyFIPS'].columns, axis=1)
display(counties)
```

```
             County Name State  StateFIPS  2020-01-22_x  2020-01-23_x  \
2329  philadelphia county    PA         42             0             0
2280     allegheny county    PA         42             0             0
2324    montgomery county    PA         42             0             0

      2020-01-24_x  2020-01-25_x  2020-01-26_x  2020-01-27_x  2020-01-28_x  \
2329             0             0             0             0             0
2280             0             0             0             0             0
2324             0             0             0             0             0

      …  2023-01-28_y  2023-01-29_y  2023-01-30_y  2023-01-31_y  \
2329  …          5475          5475          5475          5475
2280  …          3764          3764          3764          3764
2324  …          2606          2606          2606          2606

      2023-02-01_y  2023-02-02_y  2023-02-03_y  2023-02-04_y  2023-02-05_y  \
2329          5491          5491          5491          5491          5491
2280          3781          3781          3781          3781          3781
2324          2619          2619          2619          2619          2619

      population
2329     1584064
2280     1216045
2324      830915

[3 rows x 2226 columns]
```

[511]:
```
counties = counties.drop(counties.loc[:, 'State':'2022-05-31_x'].columns,␣
 ↪axis=1)
display(counties)
```

```
             County Name  2022-06-01_x  2022-06-02_x  2022-06-03_x  \
2329  philadelphia county        326427        326427        326427
2280     allegheny county        282476        282476        282476
2324    montgomery county        164608        164608        164608

      2022-06-04_x  2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  \
2329        326427        326427        326427        326427        329300
2280        282476        282476        282476        282476        285367
2324        164608        164608        164608        164608        166215

      2022-06-09_x  …  2023-01-28_y  2023-01-29_y  2023-01-30_y  \
2329        329300  …          5475          5475          5475
```

```
2280        285367  …          3764          3764          3764
2324        166215  …          2606          2606          2606

      2023-01-31_y  2023-02-01_y  2023-02-02_y  2023-02-03_y  2023-02-04_y  \
2329          5475          5491          5491          5491          5491
2280          3764          3781          3781          3781          3781
2324          2606          2619          2619          2619          2619

      2023-02-05_y  population
2329          5491     1584064
2280          3781     1216045
2324          2619      830915

[3 rows x 1363 columns]
```

[512]:
```
counties = counties.drop(counties.loc[:, '2023-01-01_x':'2022-05-31_y'].
↪columns, axis=1)
display(counties)
```

```
             County Name  2022-06-01_x  2022-06-02_x  2022-06-03_x  \
2329  philadelphia county        326427        326427        326427
2280     allegheny county        282476        282476        282476
2324    montgomery county        164608        164608        164608

      2022-06-04_x  2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  \
2329        326427        326427        326427        326427        329300
2280        282476        282476        282476        282476        285367
2324        164608        164608        164608        164608        166215

      2022-06-09_x  …  2023-01-28_y  2023-01-29_y  2023-01-30_y  \
2329        329300  …          5475          5475          5475
2280        285367  …          3764          3764          3764
2324        166215  …          2606          2606          2606

      2023-01-31_y  2023-02-01_y  2023-02-02_y  2023-02-03_y  2023-02-04_y  \
2329          5475          5491          5491          5491          5491
2280          3764          3781          3781          3781          3781
2324          2606          2619          2619          2619          2619

      2023-02-05_y  population
2329          5491     1584064
2280          3781     1216045
2324          2619      830915

[3 rows x 466 columns]
```

[513]:
```
counties = counties.drop(counties.loc[:, '2023-01-01_y':].columns, axis=1)
display(counties)
```

```
              County Name  2022-06-01_x  2022-06-02_x  2022-06-03_x  \
2329  philadelphia county        326427        326427        326427
2280     allegheny county        282476        282476        282476
2324    montgomery county        164608        164608        164608

      2022-06-04_x  2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  \
2329        326427        326427        326427        326427        329300
2280        282476        282476        282476        282476        285367
2324        164608        164608        164608        164608        166215

      2022-06-09_x  …  2022-12-22_y  2022-12-23_y  2022-12-24_y  \
2329        329300  …          5416          5416          5416
2280        285367  …          3698          3698          3698
2324        166215  …          2547          2547          2547

      2022-12-25_y  2022-12-26_y  2022-12-27_y  2022-12-28_y  2022-12-29_y  \
2329          5416          5416          5416          5421          5421
2280          3698          3698          3698          3703          3703
2324          2547          2547          2547          2554          2554

      2022-12-30_y  2022-12-31_y
2329          5421          5421
2280          3703          3703
2324          2554          2554

[3 rows x 429 columns]
```

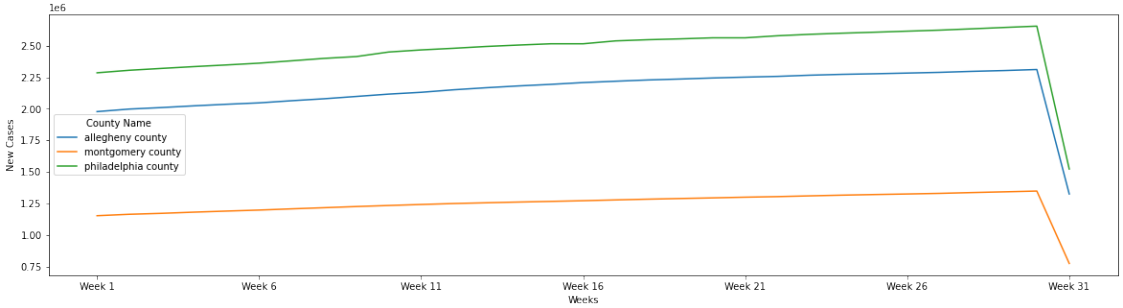
[514]:
```
# PA County New Cases Mean
counties_mean = pd.DataFrame(counties.groupby('County Name').mean())
counties_new_cases_mean = pd.DataFrame(counties_mean.drop(counties_mean.loc[:,␣
 ↪'2022-06-01_y':'2022-12-31_y'].columns, axis=1))
display(counties_new_cases_mean)
counties_new_cases_mean = counties_new_cases_mean.groupby((np.
 ↪arange(len(counties_new_cases_mean.columns)) // 7) + 1, axis=1).sum().
 ↪round().add_prefix('Week ')
display(counties_new_cases_mean)
counties_new_cases_mean.T.plot(xlabel='Weeks', ylabel='New␣
 ↪Cases',figsize=(20,5))
```

```
                    2022-06-01_x  2022-06-02_x  2022-06-03_x  2022-06-04_x  \
County Name
allegheny county         282476.0      282476.0      282476.0      282476.0
montgomery county        164608.0      164608.0      164608.0      164608.0
philadelphia county      326427.0      326427.0      326427.0      326427.0
```

```
                    2022-06-05_x  2022-06-06_x  2022-06-07_x  2022-06-08_x  \
County Name
allegheny county         282476.0      282476.0      282476.0      285367.0
montgomery county        164608.0      164608.0      164608.0      166215.0
philadelphia county      326427.0      326427.0      326427.0      329300.0

                    2022-06-09_x  2022-06-10_x  …  2022-12-22_x  \
County Name                                     …
allegheny county         285367.0      285367.0  …      330153.0
montgomery county        166215.0      166215.0  …      192512.0
philadelphia county      329300.0      329300.0  …      379244.0

                    2022-12-23_x  2022-12-24_x  2022-12-25_x  2022-12-26_x  \
County Name
allegheny county         330153.0      330153.0      330153.0      330153.0
montgomery county        192512.0      192512.0      192512.0      192512.0
philadelphia county      379244.0      379244.0      379244.0      379244.0

                    2022-12-27_x  2022-12-28_x  2022-12-29_x  2022-12-30_x  \
County Name
allegheny county         330153.0      331098.0      331098.0      331098.0
montgomery county        192512.0      193440.0      193440.0      193440.0
philadelphia county      379244.0      380548.0      380548.0      380548.0

                    2022-12-31_x
County Name
allegheny county         331098.0
montgomery county        193440.0
philadelphia county      380548.0

[3 rows x 214 columns]
                       Week 1     Week 2     Week 3     Week 4     Week 5  \
County Name
allegheny county     1977332.0  1997569.0  2009557.0  2023294.0  2035612.0
montgomery county    1152256.0  1163505.0  1171131.0  1180529.0  1188959.0
philadelphia county  2284989.0  2305100.0  2319890.0  2334206.0  2347316.0

                       Week 6     Week 7     Week 8     Week 9    Week 10  \
County Name
allegheny county     2046569.0  2063586.0  2079021.0  2097424.0  2116051.0
montgomery county    1196909.0  1206534.0  1215620.0  1224902.0  1233218.0
philadelphia county  2361317.0  2379916.0  2399089.0  2413663.0  2449706.0

                     …    Week 22    Week 23    Week 24    Week 25  \
County Name          …
allegheny county     …  2256533.0  2265907.0  2272620.0  2277338.0
```

```
montgomery county    …  1303445.0  1309483.0  1315111.0  1319920.0
philadelphia county  …  2578576.0  2589986.0  2599009.0  2606681.0

                        Week 26    Week 27    Week 28    Week 29    Week 30  \
County Name
allegheny county     2282756.0  2288419.0  2296350.0  2302797.0  2311071.0
montgomery county    1324302.0  1329167.0  1335551.0  1341452.0  1347584.0
philadelphia county  2614955.0  2623026.0  2633547.0  2644320.0  2654708.0

                        Week 31
County Name
allegheny county     1324392.0
montgomery county     773760.0
philadelphia county  1522192.0

[3 rows x 31 columns]
```

[514]: <Axes: xlabel='Weeks', ylabel='New Cases'>



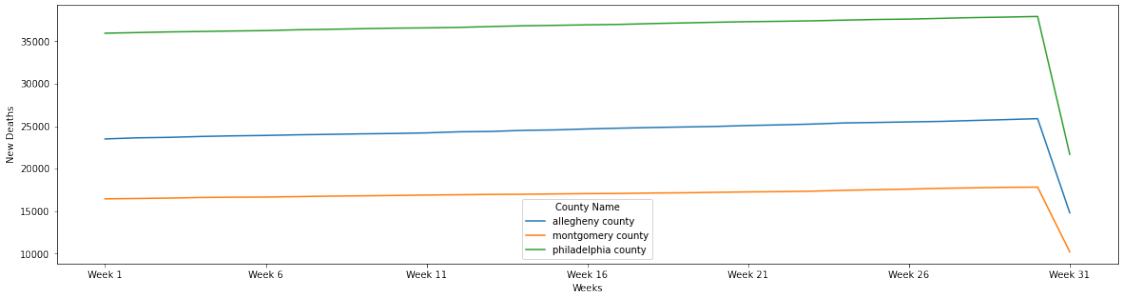
[515]:
```
# PA County New Deaths Mean
counties_mean = pd.DataFrame(counties.groupby('County Name').mean())
counties_new_deaths_mean = pd.DataFrame(counties_mean.drop(counties_mean.loc[:,␣
 ↪'2022-06-01_x':'2022-12-31_x'].columns, axis=1))
display(counties_new_deaths_mean)
counties_new_deaths_mean = counties_new_deaths_mean.groupby((np.
 ↪arange(len(counties_new_deaths_mean.columns)) // 7) + 1, axis=1).sum().
 ↪round().add_prefix('Week ')
display(counties_new_deaths_mean)
counties_new_deaths_mean.T.plot(xlabel='Weeks', ylabel='New␣
 ↪Deaths',figsize=(20,5))
```

```
                     2022-06-01_y  2022-06-02_y  2022-06-03_y  2022-06-04_y  \
County Name
allegheny county           3357.0        3357.0        3357.0        3357.0
montgomery county          2350.0        2350.0        2350.0        2350.0
philadelphia county        5134.0        5134.0        5134.0        5134.0
```

```
                    2022-06-05_y  2022-06-06_y  2022-06-07_y  2022-06-08_y  \
County Name
allegheny county          3357.0        3357.0        3357.0        3376.0
montgomery county         2350.0        2350.0        2350.0        2356.0
philadelphia county       5134.0        5134.0        5134.0        5145.0

                    2022-06-09_y  2022-06-10_y  …  2022-12-22_y  \
County Name                                     …
allegheny county          3376.0        3376.0  …        3698.0
montgomery county         2356.0        2356.0  …        2547.0
philadelphia county       5145.0        5145.0  …        5416.0

                    2022-12-23_y  2022-12-24_y  2022-12-25_y  2022-12-26_y  \
County Name
allegheny county          3698.0        3698.0        3698.0        3698.0
montgomery county         2547.0        2547.0        2547.0        2547.0
philadelphia county       5416.0        5416.0        5416.0        5416.0

                    2022-12-27_y  2022-12-28_y  2022-12-29_y  2022-12-30_y  \
County Name
allegheny county          3698.0        3703.0        3703.0        3703.0
montgomery county         2547.0        2554.0        2554.0        2554.0
philadelphia county       5416.0        5421.0        5421.0        5421.0

                    2022-12-31_y
County Name
allegheny county          3703.0
montgomery county         2554.0
philadelphia county       5421.0

[3 rows x 214 columns]
                     Week 1   Week 2   Week 3   Week 4   Week 5   Week 6  \
County Name
allegheny county     23499.0  23632.0  23686.0  23793.0  23865.0  23912.0
montgomery county    16450.0  16492.0  16540.0  16611.0  16647.0  16660.0
philadelphia county  35938.0  36015.0  36093.0  36141.0  36201.0  36246.0

                     Week 7   Week 8   Week 9  Week 10  …  Week 22  \
County Name                                             …
allegheny county     23989.0  24038.0  24101.0  24143.0  …  25153.0
montgomery county    16716.0  16772.0  16807.0  16849.0  …  17299.0
philadelphia county  36344.0  36400.0  36470.0  36533.0  …  37338.0

                    Week 23  Week 24  Week 25  Week 26  Week 27  Week 28  \
County Name
allegheny county     25249.0  25382.0  25438.0  25501.0  25564.0  25669.0
```

```
montgomery county    17353.0  17458.0  17528.0  17598.0  17689.0  17745.0
philadelphia county  37394.0  37478.0  37555.0  37597.0  37688.0  37779.0

                     Week 29  Week 30  Week 31
County Name
allegheny county     25774.0  25886.0  14812.0
montgomery county    17801.0  17829.0  10216.0
philadelphia county  37835.0  37912.0  21684.0

[3 rows x 31 columns]
```

[515]: <Axes: xlabel='Weeks', ylabel='New Deaths'>



5 Anaysis of Project

From the analysis of both new cases and new deaths my only assumption would be that the state of PA has kept the covid cases more contained and is why the deaths did not correlate to the data shown from cases to deaths. Also the assumption that people wanted to travel from Georgia most is probably why the death count was so high there. The state with the highest cases reported was Pennsylvania with roughly 350,000 cases and the state with the highest death count was Georgia with roughly 100,000. This data shows that as the time approached towards the holidays the counts went up.

When thinking about the county data and comparing it to US data it shows the exact same correlation for the rise of cases and deaths. The counties chosen were the top 3 populated counties in Pennsylvania