Library Imports

```
pip install distfit
```

```
Requirement already satisfied: distfit in /usr/local/lib/python3.10/dist-packages (1.7.3)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from distfit) (24.0)
Requirement already satisfied: matplotlib>=3.5.2 in /usr/local/lib/python3.10/dist-packages (from distfit) (3.7.1)
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (from distfit) (1.25.2)
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages (from distfit) (2.0.3)
Requirement already satisfied: statsmodels in /usr/local/lib/python3.10/dist-packages (from distfit) (0.14.1)
Requirement already satisfied: scipy in /usr/local/lib/python3.10/dist-packages (from distfit) (1.11.4)
Requirement already satisfied: pypickle in /usr/local/lib/python3.10/dist-packages (from distfit) (1.1.0)
Requirement already satisfied: colourmap>=1.1.10 in /usr/local/lib/python3.10/dist-packages (from distfit) (1.1.16)
Requirement already satisfied: joblib in /usr/local/lib/python3.10/dist-packages (from distfit) (1.3.2)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (1.2.1)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (4.50.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (1.4.5)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (9.4.0)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (3.1.2)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.5.2->distfit) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas->distfit) (2023.4)
Requirement already satisfied: tzdata>=2022.1 in /usr/local/lib/python3.10/dist-packages (from pandas->distfit) (2024.1)
Requirement already satisfied: patsy>=0.5.4 in /usr/local/lib/python3.10/dist-packages (from statsmodels->distfit) (0.5.6)
Requirement already satisfied: six in /usr/local/lib/python3.10/dist-packages (from patsy>=0.5.4->statsmodels->distfit) (1.16.0)
```

```
# import libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from collections import Counter
from distfit import distfit
import statistics as sts
```

Exploring Binomial Data Generation

```
# explore the binomial data generation
np.random.seed(123)
first_list = []
for i in range(100000):
  successes = np.random.binomial(1, 0.02, 30)
  first_list.append(sum(successes))

counts = Counter(first_list)

sorted_counts = counts.most_common()

# Print counts and values
```

```
for value, count in sorted_counts:
    print(f"Value: {value}, Count: {count}")
```

```
Value: 0, Count: 54652
Value: 1, Count: 33374
Value: 2, Count: 9770
Value: 3, Count: 1908
Value: 4, Count: 263
Value: 5, Count: 32
Value: 6, Count: 1
```

```
# method 2 for exploring binomial data generation
np.random.seed(999999999)
second_list = np.random.binomial(30, 0.02, 100000)

counts = Counter(second_list)

sorted_counts = counts.most_common()

# Print counts and values
for value, count in sorted_counts:
    print(f"Value: {value}, Count: {count}")
```

```
Value: 0, Count: 54546
Value: 1, Count: 33525
Value: 2, Count: 9701
Value: 3, Count: 1952
Value: 4, Count: 243
Value: 5, Count: 32
Value: 6, Count: 1
```

Base Case Simulation

```
'''
For the first case where there is a 0 percent chance o
1) Define a simulation
2) run the simulation n times

keep track of for future updates:
1) newly infected: 3 days later we need to remove that
2)
'''

# define the simulation
def simulate_pandemic(seed):

  # set initial values and params, edit as needed
  total_students = 31
  p_infected = 0.02
  num_infected_start = [1]
  num_infected_new = []
  num_no_longer_infected_new = [0, 0]
  total_num_no_longer_infected = [0, 0]
  day = 0
  days_infected = 3
  can_get_reinfected = False
  probably_immunized = False
  can_get_infected = True
  num_possible_to_infect = [total_students - num_infect


  # end when no one can be infected
  while num_infected_start[-1] != 0:

    day += 1
    # print(day)

    # update the seed
```

```
    seed += day
    np.random.seed(seed)



    # how many are infected to begin with today
    if day > 1:
      num_infected_start.append(num_infected_start[day
      # print('num_infected_start')
      # print(num_infected_start)

      # determine who we can infect
      num_possible_to_infect.append(total_students - nu
      # print('num_possible_to_infect')
      # print(num_possible_to_infect)


    # run this portion during the weekdays
    if 1 <= day % 7 <= 5:

      # infect some new students, muahahahaha
      if num_infected_start[day - 1] < 0:
        print('num_infected_start')
        print(num_infected_start)
        print('num_possible_to_infect')
        print(num_possible_to_infect)
        print('num_infected_new')
        print(num_infected_new)
        print('num_no_longer_infected_new')
        print(num_no_longer_infected_new)
        print('total_num_no_longer_infected')
        print(total_num_no_longer_infected)

      if num_possible_to_infect[day - 1] < 0:
        print('num_infected_start')
```

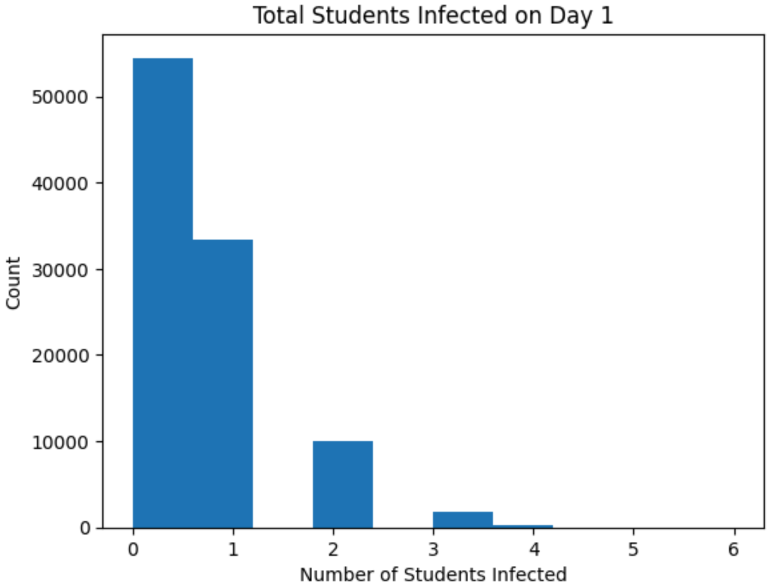
```
        print(num_infected_start)
        print('num_possible_to_infect')
        print(num_possible_to_infect)
        print('num_infected_new')
        print(num_infected_new)
        print('num_no_longer_infected_new')
        print(num_no_longer_infected_new)
        print('total_num_no_longer_infected')
        print(total_num_no_longer_infected)

        print(seed)

      new_infected = np.sum(np.random.binomial(num_infe
      num_infected_new.append(new_infected)
      # print('num_infected_new')
      # print(num_infected_new)


    # run this portion during the weekends
    else:
      num_infected_new.append(0)
      # print('num_infected_new')
      # print(num_infected_new)

    # determine the number no longer infected and updat
    if day > 2:
      if day == 3:
        num_no_longer_infected_new.append(num_infected_
      else:
        num_no_longer_infected_new.append(num_infected_

      # print('num_no_longer_infected_new')
      # print(num_no_longer_infected_new)

      total_num_no_longer_infected.append(total_num_no_
      # print('total_num_no_longer_infected')
      # print(total_num_no_longer_infected)


  return day - 1, num_infected_start, num_infected_new

# single run of the above function
simulate_pandemic(5555)
```

```
(8, [1, 1, 1, 1, 1, 2, 1, 1, 0], [0, 0, 1, 0, 1, 0, 0, 0, 0])
```

```
# run the simulation n times and return outcome
from matplotlib import pyplot as plt


n = 100000
pandemic_length = []
second_day_list = []
first_day_list = []
second_day_total = []
infected_totals = []


for i in range(n):
  seed = i+1234567+1
  run_i = simulate_pandemic(seed)

  pandemic_length.append(run_i[0])
  second_day_list.append(run_i[2][1])
  first_day_list.append(run_i[2][0])
  second_day_total.append(run_i[1][2])
  infected_totals.append(run_i[1])
```

```
# first day expected number newly infected

plt.hist(first_day_list)

# plt.hist(second_day_total)
plt.xlabel('Number of Students Infected')
plt.ylabel('Count')
plt.title('Total Students Infected on Day 1')
```

```
Text(0.5, 1.0, 'Total Students Infected on Day 1')
```

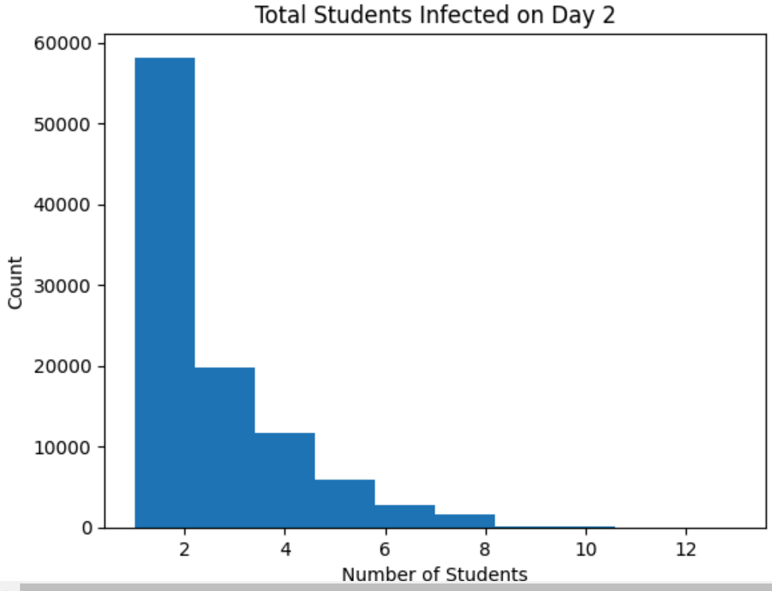


```
counts_day_2_end = Counter(second_day_total)

counts_day_1 = Counter(first_day_list)


print(round(sts.mean(map(float, first_day_list)),2))
print(counts_day_1)
```

```
0.6
Counter({0: 54452, 1: 33329, 2: 10029, 3: 1880, 4: 279, 5: 29, 6: 2})
```

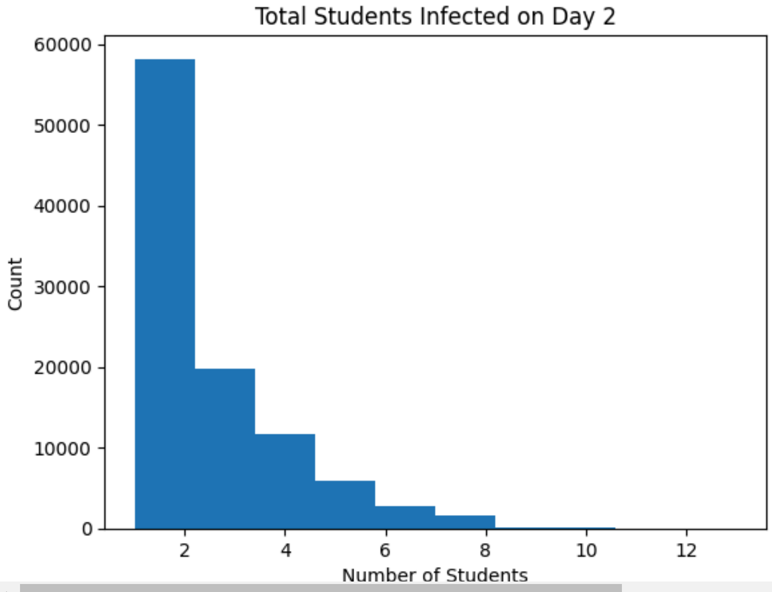
```
# second day expected number newly infected

#plt.hist(second_day_list)

plt.hist(second_day_total)
plt.xlabel('Number of Students')
plt.ylabel('Count')
plt.title('New Students Infected on Day 2')
counts_day_2_end = Counter(second_day_total)

counts_day_2 = Counter(second_day_list)


print(round(sts.mean(map(float, second_day_list)),2))
print(counts_day_2)
```

```
0.92
Counter({0: 42172, 1: 34442, 2: 15759, 3: 5491, 4: 1598, 5: 422, 6: 98, 7: 14, 9: 2, 8:
```



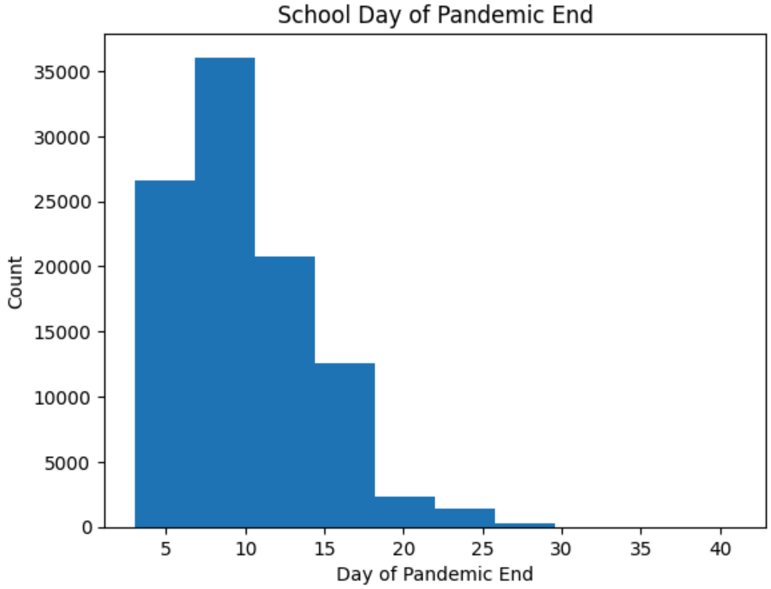
```
# total infected day 2 (start of day 3)

plt.hist(second_day_total)
plt.xlabel('Number of Students')
plt.ylabel('Count')
plt.title('Total Students Infected on Day 2')
counts_day_2_end = Counter(second_day_total)


print(round(sts.mean(map(float, second_day_total)),2))
print(counts_day_2_end)
```

```
2.52
Counter({1: 29731, 2: 28442, 3: 19737, 4: 11616, 5: 5959, 6: 2701, 7: 1146, 8: 458, 9: 1
```



```
# expected length of the pandemic: 3 days means Timmy

pand_len = round(np.average(pandemic_length),1)

print('The average length of the pandemic without immun

plt.hist(pandemic_length)

counts = Counter(pandemic_length)

sorted_counts = counts.most_common(100)

# Print counts and values
for value, count in sorted_counts:
   print(f"Value: {value}, Count: {count}")

plt.xlabel('Day of Pandemic End')
plt.ylabel('Count')
plt.title('School Day of Pandemic End')
```

```
The average length of the pandemic without immunizations is: 9.3
Value: 8, Count: 27165
Value: 3, Count: 16294
Value: 15, Count: 10413
Value: 7, Count: 8885
Value: 14, Count: 8420
Value: 11, Count: 7816
Value: 6, Count: 6035
Value: 13, Count: 3117
Value: 5, Count: 2327
Value: 18, Count: 2195
Value: 4, Count: 1934
Value: 12, Count: 1413
Value: 21, Count: 1382
Value: 22, Count: 1174
Value: 20, Count: 633
Value: 19, Count: 338
Value: 25, Count: 205
Value: 28, Count: 96
Value: 29, Count: 62
Value: 27, Count: 44
Value: 26, Count: 29
Value: 32, Count: 10
Value: 35, Count: 5
Value: 34, Count: 4
Value: 36, Count: 3
Value: 41, Count: 1
Text(0.5, 1.0, 'School Day of Pandemic End')
```



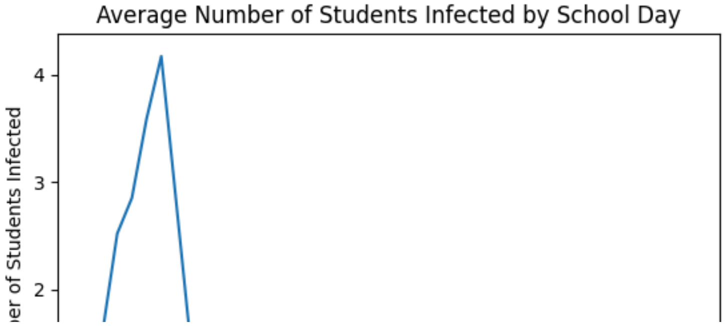
```
# define function to find longest sublist in list of l:



def FindMaxLength(lst):
    maxList = max(lst, key=len)
    maxLength = len(maxList)

    return maxList, maxLength

longest_list = FindMaxLength(infected_totals)

long_len = longest_list[1]

print(longest_list)
```

```
([1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1, 2, 2, 1, 1, 2, 2, 2, 2, 2, 1, 1, 1, 2, 3, 4, 3, 1, 1, 2, 3, 2, 2, 1, 1, 1, 1, 2, 1, 1, 0], 42)
```

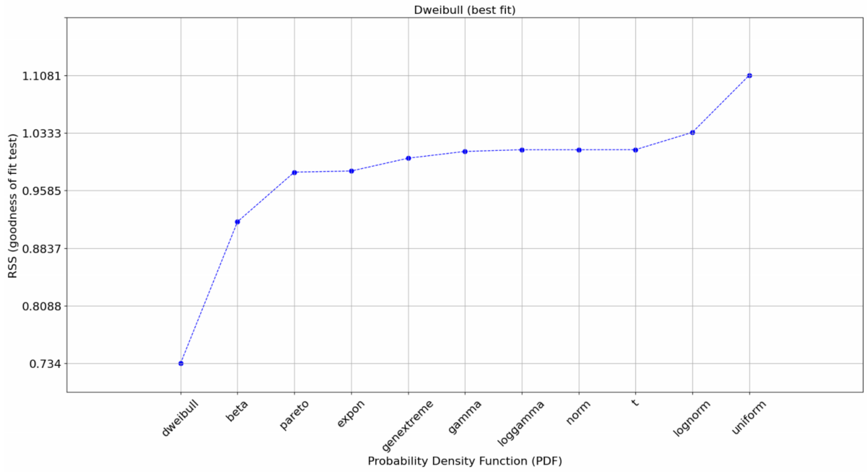
```
# fill in 0s for all sublists to reach the length of tl

for row in infected_totals:
    while len(row) < long_len:
        row.append(0)

print(infected_totals[:3])
```

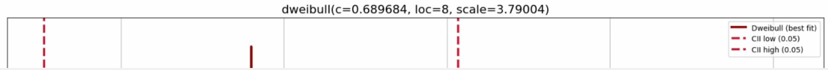
```
[[1, 1, 4, 4, 5, 4, 3, 2, 3, 6, 7, 10, 8, 7, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0], [1, 1,
# create list of expected infected on a given day, reme

df = pd.DataFrame(infected_totals)

# df.head()

expected_number_infected = df.mean()

print(expected_number_infected)

plt.plot(expected_number_infected)

plt.xlabel('School Day')
plt.ylabel('Average Number of Students Infected')
plt.title('Average Number of Students Infected by Schoo

# Display the plot
plt.show()
```

```
0     1.00000
1     1.60300
2     2.51955
3     2.85228
4     3.58893
5     4.16992
6     2.83719
7     1.49754
8     0.59342
9     0.81649
10    1.11076
11    0.88382
12    0.93084
13    0.63657
14    0.27009
15    0.08013
16    0.10373
17    0.13281
18    0.08856
19    0.08706
20    0.05798
21    0.02210
22    0.00537
23    0.00672
24    0.00817
25    0.00469
26    0.00434
27    0.00289
28    0.00100
29    0.00026
30    0.00029
31    0.00036
32    0.00018
33    0.00019
34    0.00012
35    0.00004
36    0.00001
37    0.00001
38    0.00002
39    0.00001
40    0.00001
41    0.00000
dtype: float64
```



```
# distfit for 1st case
dfit = distfit()

results = dfit.fit_transform(np.array(pandemic_length)

# Plot summary
dfit.plot_summary()

# PDF plot
dfit.plot()

# Plot PDF
fig, ax = dfit.plot(chart='pdf')

# Add the CDF to the plot
fig, ax = dfit.plot(chart='cdf', n_top=1, ax=ax)

# QQ-plot for top 10 fitted distributions
fig, ax = dfit.qqplot(np.array(pandemic_length), n_top=
[distfit] >INFO> fit
[distfit] >INFO> transform
[distfit] >DEBUG> (9.27281, 4.791159014674841)
[distfit] >INFO> [norm      ] [0.00 sec] [RSS: 1.01139] [loc=9.273 scale=4.791]
[distfit] >DEBUG> (3.0, 6.27281)
[distfit] >INFO> [expon     ] [0.00 sec] [RSS: 0.983782] [loc=3.000 scale=6.273]
[distfit] >DEBUG> (0.19819047568195483, 2.9846951442544345, 0.015304855745565503)
[distfit] >INFO> [pareto    ] [0.07 sec] [RSS: 0.98232] [loc=2.985 scale=0.015]
[distfit] >DEBUG> (0.6896837323138969, 7.999999999999999, 3.790042166405748)
[distfit] >INFO> [dweibull  ] [3.17 sec] [RSS: 0.734024] [loc=8.000 scale=3.790]
[distfit] >DEBUG> (32.81512516633748, 9.177041758905766, 4.641213983425024)
[distfit] >INFO> [t         ] [5.82 sec] [RSS: 1.01151] [loc=9.177 scale=4.641]
[distfit] >DEBUG> (0.007271409042235029, 7.062049601049226, 3.8379950891697727)
[distfit] >INFO> [genextreme] [2.57 sec] [RSS: 1.00038] [loc=7.062 scale=3.838]
[distfit] >DEBUG> (0.41605540676148384, 2.999999999999999, 7.141253595050882)
[distfit] >INFO> [gamma     ] [1.46 sec] [RSS: 1.00922] [loc=3.000 scale=7.141]
[distfit] >DEBUG> (13.74801264299348, 2.9999999999999996, 0.014766443492842826)
[distfit] >INFO> [lognorm   ] [0.21 sec] [RSS: 1.03395] [loc=3.000 scale=0.015]
[distfit] >DEBUG> (0.30562372639346475, 5.167672677493069, 2.9999999999999996, 182.14
[distfit] >INFO> [beta      ] [3.03 sec] [RSS: 0.91781] [loc=3.000 scale=182.143]
[distfit] >DEBUG> (3.0, 38.0)
[distfit] >INFO> [uniform   ] [0.00 sec] [RSS: 1.1081] [loc=3.000 scale=38.000]
[distfit] >DEBUG> (2046.3990438601468, -1665.3167220043908, 219.65836102468535)
[distfit] >INFO> [loggamma  ] [1.80 sec] [RSS: 1.01137] [loc=-1665.317 scale=219.658
[distfit] >INFO> Compute confidence intervals [parametric]
[distfit] >INFO> Ploting Summary.
[distfit] >INFO> Create pdf plot for the parametric method.
[distfit] >INFO> Estimated distribution: Dweibull(loc:8.000000, scale:3.790042)
[distfit] >INFO> Create pdf plot for the parametric method.
[distfit] >INFO> Estimated distribution: Dweibull(loc:8.000000, scale:3.790042)
[distfit] >INFO> Create cdf plot for the parametric method.
[distfit] >INFO> Ploting CDF
```





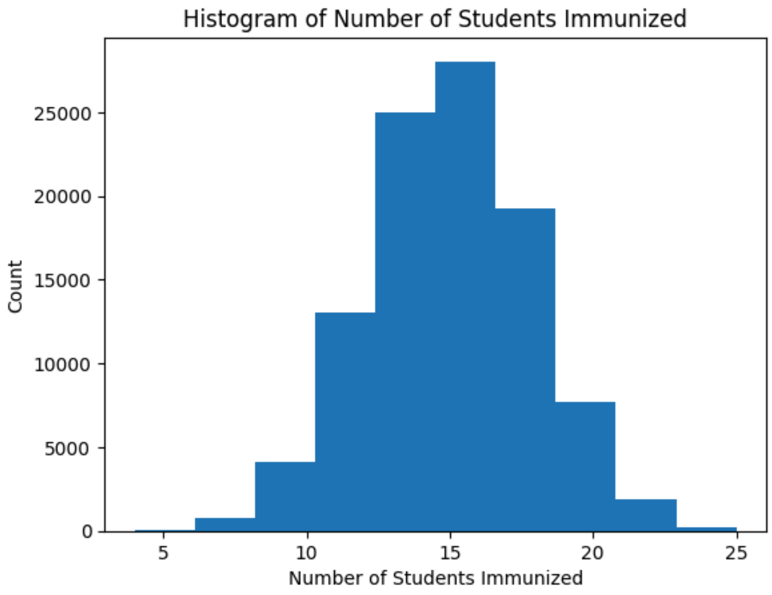
Case 2 Simulation (immunized case)

```
'''
For the second case where there is a 50 percent chance
1) Define a simulation
2) run the simulation n times

keep track of for future updates:
1) newly infected: 3 days later we need to remove that
2)
'''

# define the simulation
def simulate_pandemic_immunized(seed):

  # set initial values and params, edit as needed
  total_students = 31
  p_infected = 0.02
  num_infected_start = [1]
  num_infected_new = []
  day = 0
  days_infected = 3
  can_get_reinfected = False
  probability_immunized = 0.5
  can_get_infected = True


  # determine the number of people who are immunized
  num_immunized = np.random.binomial(total_students - 

  num_no_longer_infected_new = [0, 0]
  total_num_no_longer_infected = [num_immunized, num_i
  num_possible_to_infect = [total_students - num_infec


  # end when no one can be infected
  while num_infected_start[-1] != 0:
```

```
    day += 1
    # print(day)

    # update the seed
    seed += day
    np.random.seed(seed)



    # how many are infected to begin with today
    if day > 1:
      num_infected_start.append(num_infected_start[day
      # print('num_infected_start')
      # print(num_infected_start)

      # determine who we can infect
      num_possible_to_infect.append(total_students - nu
      # print('num_possible_to_infect')
      # print(num_possible_to_infect)


    # run this portion during the weekdays
    if 1 <= day % 7 <= 5:

      # infect some new students, muahahahaha
      new_infected = np.sum(np.random.binomial(num_infe
      num_infected_new.append(new_infected)
      # print('num_infected_new')
      # print(num_infected_new)


    # run this portion during the weekends
    else:
      num_infected_new.append(0)
      # print('num_infected_new')
      # print(num_infected_new)

    # determine the number no longer infected and updat
    if day > 2:
      if day == 3:
        num_no_longer_infected_new.append(num_infected_
      else:
        num_no_longer_infected_new.append(num_infected_

      # print('num_no_longer_infected_new')
      # print(num_no_longer_infected_new)

      total_num_no_longer_infected.append(total_num_no_
      # print('total_num_no_longer_infected')
      # print(total_num_no_longer_infected)


  return day - 1, num_infected_start, num_infected_new,
# run a bunch of times
n = 100000
pandemic_length = []
second_day_list = []
first_day_list = []
second_day_total = []
infected_totals = []
num_immunized_ls = []

for i in range(n):
  seed = i+123456789+1
  run_i = simulate_pandemic_immunized(seed)
  pandemic_length.append(run_i[0])
  second_day_list.append(run_i[2][1])
  first_day_list.append(run_i[2][0])
  second_day_total.append(run_i[1][2])
  infected_totals.append(run_i[1])
  num_immunized_ls.append(run_i[3])
```

```
# plot number immunized

plt.hist(num_immunized_ls)
plt.title('Histogram of Number of Students Immunized')
plt.ylabel('Count')
plt.xlabel('Number of Students Immunized')
```

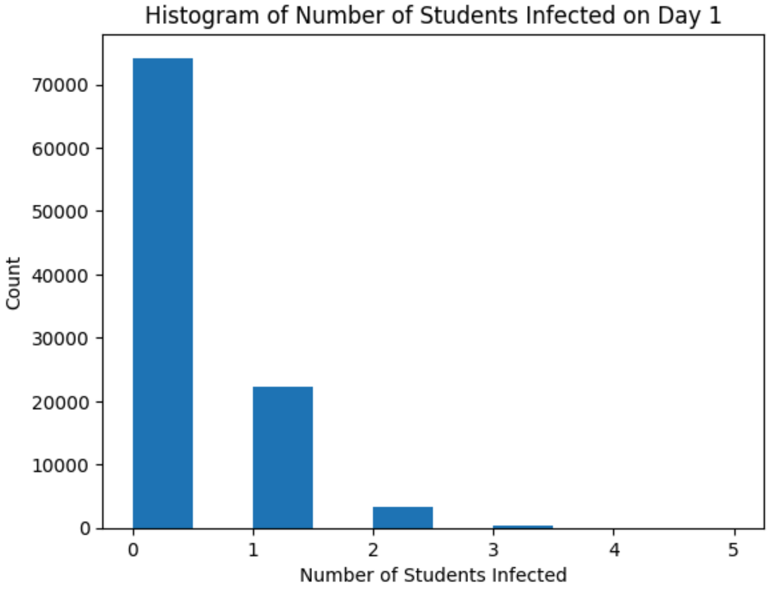
```
Text(0.5, 0, 'Number of Students Immunized')
```



Histogram of Number of Students Immunized

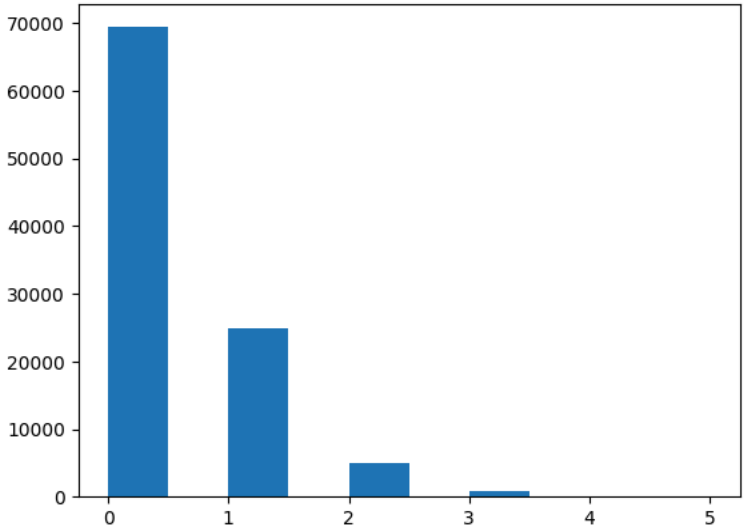
```
# first day expected number newly infected

plt.hist(first_day_list)
plt.title('Histogram of Number of Students Infected on
plt.ylabel('Count')
plt.xlabel('Number of Students Infected')
counts_day_1 = Counter(first_day_list)

print(round(sts.mean(map(float, first_day_list)),2))
print(counts_day_1)
```

```
0.3
Counter({0: 74168, 1: 22256, 2: 3270, 3: 283, 4: 22, 5: 1})
```



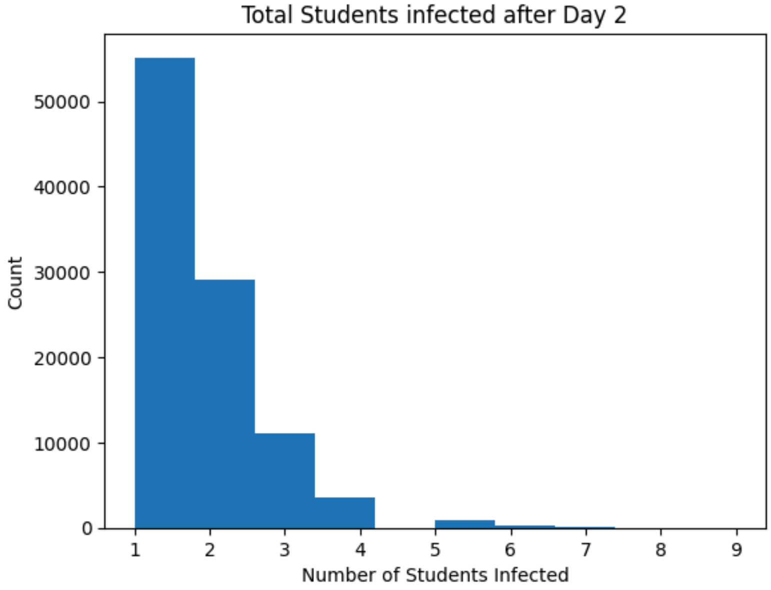
```
# second day expected number newly infected

plt.hist(second_day_list)

counts_day_2 = Counter(second_day_list)

print(round(sts.mean(map(float, second_day_list)),2))
print(counts_day_2)
```

```
0.37
Counter({0: 69374, 1: 24796, 2: 4958, 3: 765, 4: 98, 5: 9})
```



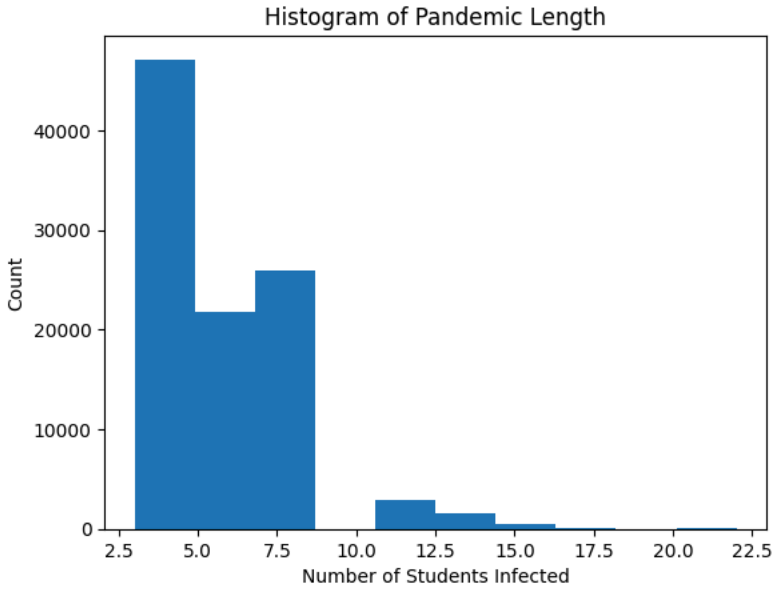
```
# total infected day 2 (start of day 3)

plt.hist(second_day_total)
plt.title('Total Students infected after Day 2')
plt.ylabel('Count')
plt.xlabel('Number of Students Infected')

counts_day_2_end = Counter(second_day_total)

print(round(sts.mean(map(float, second_day_total)),2))
print(counts_day_2_end)
```

```
1.67
Counter({1: 55135, 2: 29051, 3: 11020, 4: 3493, 5: 970, 6: 267, 7: 53, 8: 9, 9: 2})
```



```
# pandemic length distribution. 3 means no one was infe

plt.hist(pandemic_length)
plt.title('Histogram of Pandemic Length')
plt.ylabel('Count')
plt.xlabel('Number of Students Infected')

average_pandemic_length = np.average(pandemic_length)

print('The average pandemic length with immunizations i

counts = Counter(pandemic_length)

sorted_counts = counts.most_common(100)

# Print counts and values
for value, count in sorted_counts:
   print(f"Value: {value}, Count: {count}")
```

```
The average pandemic length with immunizations is: 5.31177
Value: 3, Count: 41137
Value: 8, Count: 14918
Value: 6, Count: 14050
Value: 7, Count: 11069
Value: 5, Count: 7724
Value: 4, Count: 5982
Value: 11, Count: 2481
Value: 14, Count: 1026
Value: 13, Count: 574
Value: 15, Count: 516
Value: 12, Count: 385
Value: 18, Count: 89
Value: 21, Count: 23
Value: 20, Count: 11
Value: 22, Count: 8
Value: 19, Count: 7
```



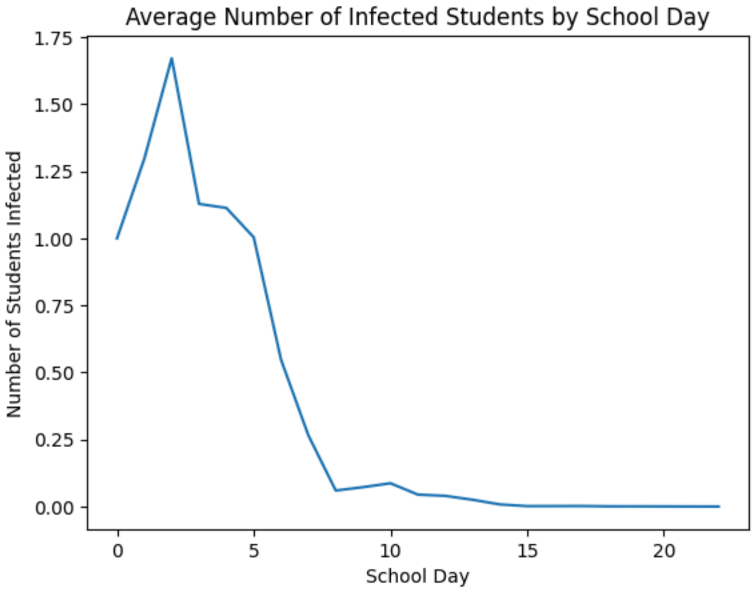
```
# get longest sublist

longest_list = FindMaxLength(infected_totals)
long_len = longest_list[1]
print(longest_list)
```

```
([1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 2, 1, 3, 2, 2, 1, 1, 2, 1, 2, 1, 1, 0], 23)
```

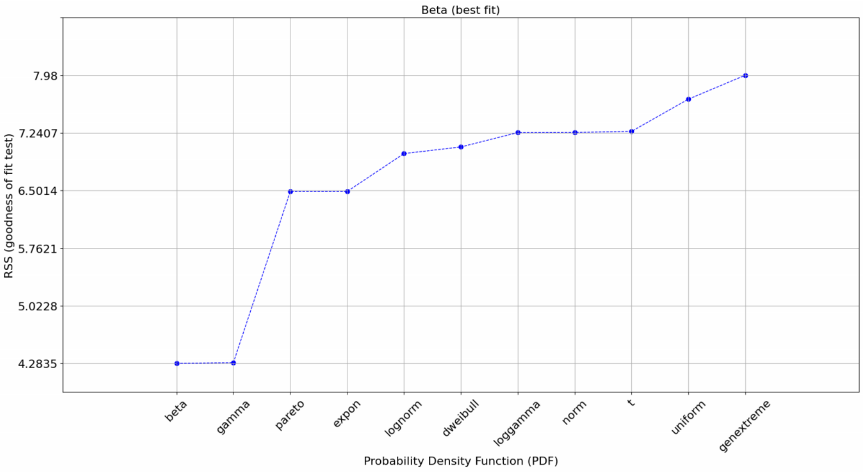
```
# fill in 0s for all sublists to reach the length of th

for row in infected_totals:
    while len(row) < long_len:
        row.append(0)

print(infected_totals[:3])
```

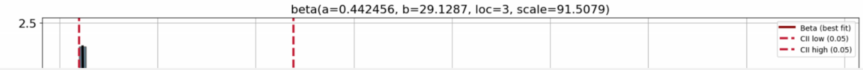
```
[[1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0], [1, 2, 2, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
df2 = pd.DataFrame(infected_totals)

# df.head()

expected_number_infected = df2.mean()

print(expected_number_infected)

plt.plot(expected_number_infected)
plt.title('Average Number of Infected Students by Scho
plt.ylabel('Number of Students Infected')
plt.xlabel('School Day')
```

```
0     1.00000
1     1.29738
2     1.67182
3     1.12872
4     1.11353
5     1.00406
6     0.54716
7     0.26497
8     0.05964
9     0.07219
10    0.08671
11    0.04448
12    0.03980
13    0.02528
14    0.00787
15    0.00147
16    0.00163
17    0.00183
18    0.00065
19    0.00058
20    0.00038
21    0.00009
22    0.00000
dtype: float64
Text(0.5, 0, 'School Day')
```



```
# distfit for 2nd case
dfit = distfit()

results = dfit.fit_transform(np.array(pandemic_length)

# Plot summary
dfit.plot_summary()

# PDF plot
dfit.plot()

# Plot PDF
fig, ax = dfit.plot(chart='pdf')

# Add the CDF to the plot
fig, ax = dfit.plot(chart='cdf', n_top=1, ax=ax)

# QQ-plot for top 10 fitted distributions
fig, ax = dfit.qqplot(np.array(pandemic_length), n_top
[distfit] >INFO> fit
[distfit] >INFO> transform
[distfit] >DEBUG> (5.31177, 2.5692585442302223)
[distfit] >INFO> [norm      ] [0.00 sec] [RSS: 7.24585] [loc=5.312 scale=2.569]
[distfit] >DEBUG> (3.0, 2.31177)
[distfit] >INFO> [expon     ] [0.00 sec] [RSS: 6.48829] [loc=3.000 scale=2.312]
[distfit] >DEBUG> (27214888.41372924, -62914556.99999997, 62914559.99999996)
[distfit] >INFO> [pareto    ] [0.10 sec] [RSS: 6.48829] [loc=-62914557.000 scale=629
[distfit] >DEBUG> (1.4807247679419113, 4.716571385308445, 2.3319475388902733)
[distfit] >INFO> [dweibull  ] [0.69 sec] [RSS: 7.0601] [loc=4.717 scale=2.332]
[distfit] >DEBUG> (8.497531002921654, 5.080507578236627, 2.2214425590491045)
[distfit] >INFO> [t         ] [5.93 sec] [RSS: 7.25977] [loc=5.081 scale=2.221]
[distfit] >DEBUG> (-2.441847155257223, 3.000000000000004, 1.0243004187465576e-14)
[distfit] >INFO> [genextreme] [7.56 sec] [RSS: 7.98] [loc=3.000 scale=0.000]
[distfit] >DEBUG> (0.5003435440036585, 2.999999999999999, 2.2636758369918355)
[distfit] >INFO> [gamma     ] [1.10 sec] [RSS: 4.29243] [loc=3.000 scale=2.264]
[distfit] >DEBUG> (17.99921985006781, 2.9999999999999996, 9.893761023503774e-07)
[distfit] >INFO> [lognorm   ] [0.30 sec] [RSS: 6.97504] [loc=3.000 scale=0.000]
[distfit] >DEBUG> (0.4424556074294641, 29.12866037898901, 2.9999999999999996, 91.507
[distfit] >INFO> [beta      ] [2.73 sec] [RSS: 4.28348] [loc=3.000 scale=91.508]
[distfit] >DEBUG> (3.0, 19.0)
[distfit] >INFO> [uniform   ] [0.00 sec] [RSS: 7.6726] [loc=3.000 scale=19.000]
[distfit] >DEBUG> (1074.4486666833973, -592.7457825039883, 85.68923686436156)
[distfit] >INFO> [loggamma  ] [1.11 sec] [RSS: 7.24442] [loc=-592.746 scale=85.689]
[distfit] >INFO> Compute confidence intervals [parametric]
[distfit] >INFO> Ploting Summary.
[distfit] >INFO> Create pdf plot for the parametric method.
[distfit] >INFO> Estimated distribution: Beta(loc:3.000000, scale:91.507901)
[distfit] >INFO> Create pdf plot for the parametric method.
[distfit] >INFO> Estimated distribution: Beta(loc:3.000000, scale:91.507901)
[distfit] >INFO> Create cdf plot for the parametric method.
[distfit] >INFO> Ploting CDF
```





Simulating Multiple *p* values in the base case

```
'''
Base case - this time with multiple p values
'''

# define the simulation
def simulate_pandemic(seed,p_infected=0.02):

  # set initial values and params, edit as needed
  total_students = 31
  num_infected_start = [1]
  num_infected_new = []
  num_no_longer_infected_new = [0, 0]
  total_num_no_longer_infected = [0, 0]
  day = 0
  days_infected = 3
  can_get_reinfected = False
  probably_immunized = False
  can_get_infected = True
  num_possible_to_infect = [total_students - num_infect
```