Assignment 1

In [ ]: `#Trying out List comprehensions`

Part 1. Generate a list of random numbers using random module in Python

In [ ]:
```python
# Original
import random
random_lst = []

for i in range (1, 50):
    random_lst.append(random.randint(0,100))

print(random_lst)
```

```
[16, 18, 75, 31, 94, 95, 99, 59, 60, 34, 98, 78, 6, 71, 51, 86, 1, 82, 79, 3, 19, 81,
22, 23, 52, 32, 4, 71, 64, 31, 90, 65, 69, 21, 92, 67, 8, 28, 38, 50, 57, 69, 6, 61, 4
3, 24, 12, 38, 69]
```

In [ ]:
```python
#List Comprehension [ASSIGNMENT 3 CHNAGE]
import random
res = [random.randrange(1,100,1) for i in range(50)]
print ("Random number list is : " +  str(res))
```

```
Random number list is : [76, 29, 3, 73, 6, 37, 88, 10, 27, 7, 44, 70, 10, 71, 63, 70,
7, 43, 5, 51, 52, 13, 37, 43, 60, 28, 28, 89, 91, 19, 17, 32, 52, 94, 11, 62, 22, 46,
70, 65, 21, 17, 20, 64, 27, 17, 95, 48, 95, 13]
```

Part 2. Calculate the mean & variance value for the list by looping through its element

In [ ]:
```python
#Original
total_num = 0
for i in res:
    total_num += i
mean = total_num / len(res)
print(mean)
```

```
42.76
```

In [ ]:
```python
#List Comprehension [ASSIGNMENT 3 CHANGE]
total_num_lc = 0
total_num_lc_mean = (sum(total_num_lc + i for i in res))/len(res)
print(total_num_lc_mean)
```

```
42.76
```

Calculate the variance of the list

```
In [ ]:  #Original
         top = 0

         for i in res:
             top += pow(i-mean, 2)

         bottom = len(res)-1

         variance = top/bottom
         print(variance)
```

797.2065306122448

```
In [ ]:  #List comprehension [ASSIGNMENT 3 CHANGE]
         top2 = [(i - mean)** 2 for i in res]
         variance2 = sum(top2)/(len(res)-1)
         print(variance2)
```

797.2065306122448

Assignment 2

```
In [ ]:  #Trying out functions
```

Task 1

```
In [ ]:  import json
```

```
In [ ]:  # Original
         import requests, json
         url = "https://eric.clst.org/assets/wiki/uploads/Stuff/gz_2010_us_050_00_5m.json"

         with requests.get(url) as response:
             data = response.json()
         print('Number of Counties in US: ' + str(len(data['features'])))
         print('First entry is {}'.format(data['features'][1]['properties']['NAME']))
```

Number of Counties in US: 3221
First entry is Wade Hampton

```
In [ ]:  # get_data Function [ASSIGNMENT 3 CHANGE]
         import requests, json
         def get_data(url):
             with requests.get(url) as response:
                 return response.json()

         url = "https://eric.clst.org/assets/wiki/uploads/Stuff/gz_2010_us_050_00_5m.json"
         #get_data(url)
```

Task 2

Find the 3 most common names of counties. List the name and state code.

Part 1. Common Names

```
In [ ]:  #Create a list
         featureList = data['features']
         nameList = []

         for f in featureList:
             county_name = f['properties']['NAME']
             nameList.append(county_name)
```

```
In [ ]:  #Creating the "common_names" function [ASSIGNMENT 3 CHANGE]
         def common_names(nameList):
           common_names_dict = {}
           for name in nameList:
             if name in common_names_dict:
               common_names_dict[name] +=1
             else:
               common_names_dict[name] =1
           return common_names_dict

         repeats = common_names(nameList)
```

```
In [ ]:  #Sort
         sorted_repeats = sorted(repeats.items(), key=lambda x:x[1], reverse=True)
         top_repeats = sorted_repeats[0:3]
         converted_repeats = dict(top_repeats)

         #Answer
         print(converted_repeats)

         for county in converted_repeats.keys():
           print(f"One of the three most common county names is {county.title()}.")
```

```
{'Washington': 31, 'Franklin': 26, 'Jefferson': 26}
One of the three most common county names is Washington.
One of the three most common county names is Franklin.
One of the three most common county names is Jefferson.
```

Part 2. State codes

```
In [ ]:   #Creating a function [ASSIGNMENT 3 CHANGE]
          #Creating the function find_state_codes
          featureList = data['features']

          def find_state_code(sc):
              Repeats3_List = []

              for f in featureList:
                  properties = f['properties']
                  county_name = properties['NAME']
                  state_code = properties['STATE']

                  if county_name == (sc):
                      Repeats3_List.append(state_code)
                  else:
                      pass

              return Repeats3_List
```

```
In [ ]:   Washington_list = find_state_code("Washington")
          print(f" The number of states that have the county name of Washington is {len(Washingt
```

```
 The number of states that have the county name of Washington is 31.
 State codes: ['01', '05', '08', '12', '13', '16', '17', '18', '19', '20', '21', '22',
'23', '24', '27', '28', '29', '31', '36', '37', '39', '40', '41', '42', '44', '47', '4
8', '49', '50', '51', '55']
```

```
In [ ]:   Franklin_list = find_state_code("Franklin")
          print(f" The number of states that have the county name of Franklin is {len(Franklin_l
```

```
 The number of states that have the county name of Franklin is 26.
 State codes: ['01', '05', '12', '13', '16', '17', '18', '19', '20', '21', '22', '23',
'25', '28', '29', '31', '36', '37', '39', '42', '47', '48', '50', '51', '51', '53']
```

```
In [ ]:   Jefferson_list = find_state_code("Jefferson")
          print(f" The number of states that have the county name of Jefferson is {len(Jefferson
```

```
 The number of states that have the county name of Jefferson is 26.
 State codes: ['01', '05', '08', '12', '13', '16', '17', '18', '19', '20', '21', '22',
'28', '29', '30', '31', '36', '39', '40', '41', '42', '47', '48', '53', '54', '55']
```

Task 3: Basic statistics by state

For each state find:

- Number of counties
- Name and size (census area) of the biggest and smallest county by area
- Find the total and average area of counties

```python
In [ ]:  #Number of counties (Original...Didn't think it would benefit from a change)
         state_dict_counties = {}

         for element in data['features']:
           properties = element['properties']
           state_code = properties['STATE']
           state_dict_counties[state_code] = state_dict_counties.get(state_code, 0) + 1

         print(state_dict_counties)
```

```
{'02': 29, '04': 15, '05': 75, '08': 64, '09': 8, '12': 67, '13': 159, '06': 58, '01':
67, '17': 102, '18': 92, '19': 99, '15': 5, '16': 44, '20': 105, '21': 120, '22': 64,
'26': 83, '27': 87, '28': 82, '23': 16, '24': 24, '25': 14, '30': 56, '31': 93, '32':
17, '33': 10, '34': 21, '35': 33, '29': 115, '37': 100, '38': 53, '39': 88, '40': 77,
'36': 62, '45': 46, '46': 66, '47': 95, '41': 36, '42': 67, '48': 254, '49': 29, '53':
39, '54': 55, '55': 72, '56': 23, '72': 78, '50': 14, '51': 134, '10': 3, '11': 1, '44
': 5}
```

```python
In [ ]:  #Created functions for every section [EVERYHTING BELOW IS AN ASSIGNMENT 3 CHANGE]
             # Name and size (census area) of the biggest and smallest county by area
             # Find the total and average area of counties
```

```python
In [ ]:  #sort_counties function
         def sort_counties(counties):
             counties = sorted(counties.items(),key=lambda item: item[1])
             smallest = counties[0]
             biggest = counties[len(counties)-1]
             return f'\n{smallest[0]} is the smallest county with area: {smallest[1]}\n{biggest
```

```python
In [ ]:  #get_counties_by_state function
         def get_counties_by_state(data):
             states = {}

             for element in data['features']:
                 properties = element['properties']
                 state = properties['STATE']

                 if state not in states:
                     states[state] = {}
                     states[state][properties['NAME']] = properties['CENSUSAREA']
                 else:
                     states[state][properties['NAME']] = properties['CENSUSAREA']
             return states
```

```python
In [ ]:  #get_smallest_and_largest_county_by_state function
         def get_smallest_and_largest_county_by_state(states):
             for state in states:
                 result = sort_counties(states[state])
                 #reuslt is a string with info on the smallest and largest
                 print(f'For state{state}: {result}\n')
```

```python
In [ ]: #get_total_and_avg_area_by_state function
        def  get_total_and_avg_area_by_state(states):
            for state in states:
                counties = states[state]
                #calculate total
                total = 0
                for area in counties.values():
                    total += area
                #calculate avegerage
                avg = total/len(counties)
                print(f'For state {state}, the total area is {round(total, 2)} with an average
```

```python
In [ ]: #Answer the questions function
        def answer_states_questions():
            url = "https://eric.clst.org/assets/wiki/uploads/Stuff/gz_2010_us_050_00_5m.json"
            data = get_data(url)
            states = get_counties_by_state(data)

            # part 2: For each state, find the name and size (census area) of the biggest and
            get_smallest_and_largest_county_by_state(states)

            # part 3: For each state, the total and average area of counties
            get_total_and_avg_area_by_state(states)
```

```python
In [ ]: answer_states_questions()
```

```
For state02:
Skagway is the smallest county with area: 452.325
Yukon-Koyukuk is the biggest county with area: 145504.789

For state04:
Santa Cruz is the smallest county with area: 1236.916
Coconino is the biggest county with area: 18618.885

For state05:
Lafayette is the smallest county with area: 528.268
Union is the biggest county with area: 1039.214

For state08:
Broomfield is the smallest county with area: 33.034
Las Animas is the biggest county with area: 4772.672

For state09:
Middlesex is the smallest county with area: 369.301
Litchfield is the biggest county with area: 920.56

For state12:
Union is the smallest county with area: 243.556
Collier is the biggest county with area: 1998.324

For state13:
Clarke is the smallest county with area: 119.2
Ware is the biggest county with area: 892.461

For state06:
San Francisco is the smallest county with area: 46.873
San Bernardino is the biggest county with area: 20056.938

For state01:
Etowah is the smallest county with area: 534.991
Baldwin is the biggest county with area: 1589.784

For state17:
Putnam is the smallest county with area: 160.161
McLean is the biggest county with area: 1183.378

For state18:
Ohio is the smallest county with area: 86.14
Allen is the biggest county with area: 657.308

For state19:
Dickinson is the smallest county with area: 380.606
Kossuth is the biggest county with area: 972.72

For state15:
Kalawao is the smallest county with area: 11.991
Hawaii is the biggest county with area: 4028.417

For state16:
Payette is the smallest county with area: 406.867
Idaho is the biggest county with area: 8477.352

For state20:
Wyandotte is the smallest county with area: 151.6
Butler is the biggest county with area: 1429.863
```

```
                    For state21:
                    Robertson is the smallest county with area: 99.911
                    Pike is the biggest county with area: 786.833

                    For state22:
                    Orleans is the smallest county with area: 169.423
                    Vernon is the biggest county with area: 1327.91

                    For state26:
                    Benzie is the smallest county with area: 319.704
                    Marquette is the biggest county with area: 1808.401

                    For state27:
                    Ramsey is the smallest county with area: 152.212
                    St. Louis is the biggest county with area: 6247.401

                    For state28:
                    Alcorn is the smallest county with area: 400.038
                    Yazoo is the biggest county with area: 922.947

                    For state23:
                    Sagadahoc is the smallest county with area: 253.695
                    Aroostook is the biggest county with area: 6671.33

                    For state24:
                    Baltimore is the smallest county with area: 80.944
                    Frederick is the biggest county with area: 660.221

                    For state25:
                    Nantucket is the smallest county with area: 44.97
                    Worcester is the biggest county with area: 1510.77

                    For state30:
                    Silver Bow is the smallest county with area: 718.477
                    Beaverhead is the biggest county with area: 5541.624

                    For state31:
                    Sarpy is the smallest county with area: 238.99
                    Cherry is the biggest county with area: 5960.422

                    For state32:
                    Carson City is the smallest county with area: 144.662
                    Nye is the biggest county with area: 18181.924

                    For state33:
                    Strafford is the smallest county with area: 368.975
                    Coos is the biggest county with area: 1794.685

                    For state34:
                    Hudson is the smallest county with area: 46.191
                    Burlington is the biggest county with area: 798.576

                    For state35:
                    Los Alamos is the smallest county with area: 109.167
                    Catron is the biggest county with area: 6923.69

                    For state29:
                    St. Louis is the smallest county with area: 61.909
                    Texas is the biggest county with area: 1177.266
```

```
For state37:
Chowan is the smallest county with area: 172.473
Robeson is the biggest county with area: 949.221

For state38:
Eddy is the smallest county with area: 630.171
McKenzie is the biggest county with area: 2760.323

For state39:
Lake is the smallest county with area: 227.493
Ashtabula is the biggest county with area: 701.931

For state40:
Marshall is the smallest county with area: 371.08
Osage is the biggest county with area: 2246.358

For state36:
New York is the smallest county with area: 22.829
St. Lawrence is the biggest county with area: 2680.377

For state45:
McCormick is the smallest county with area: 359.13
Horry is the biggest county with area: 1133.896

For state46:
Clay is the smallest county with area: 412.185
Meade is the biggest county with area: 3470.984

For state47:
Trousdale is the smallest county with area: 114.193
Shelby is the biggest county with area: 763.174

For state41:
Multnomah is the smallest county with area: 431.297
Harney is the biggest county with area: 10133.17

For state42:
Montour is the smallest county with area: 130.242
Lycoming is the biggest county with area: 1228.594

For state48:
Rockwall is the smallest county with area: 127.036
Brewster is the biggest county with area: 6183.733

For state49:
Davis is the smallest county with area: 298.778
San Juan is the biggest county with area: 7819.988

For state53:
San Juan is the smallest county with area: 173.915
Okanogan is the biggest county with area: 5267.978

For state54:
Hancock is the smallest county with area: 82.609
Randolph is the biggest county with area: 1039.681

For state55:
Pepin is the smallest county with area: 231.983
Marathon is the biggest county with area: 1544.983
```

```
For state56:
Hot Springs is the smallest county with area: 2004.092
Sweetwater is the biggest county with area: 10426.649

For state72:
Cata�o is the smallest county with area: 4.845
Arecibo is the biggest county with area: 125.947

For state50:
Grand Isle is the smallest county with area: 81.811
Windsor is the biggest county with area: 969.337

For state51:
Falls Church is the smallest county with area: 1.999
Pittsylvania is the biggest county with area: 968.941

For state10:
New Castle is the smallest county with area: 426.286
Sussex is the biggest county with area: 936.079

For state11:
District of Columbia is the smallest county with area: 61.048
District of Columbia is the biggest county with area: 61.048

For state44:
Bristol is the smallest county with area: 24.164
Providence is the biggest county with area: 409.502


For state 02, the total area is 570640.95 with an average county size of 19677.27
For state 04, the total area is 113594.09 with an average county size of 7572.94
For state 05, the total area is 52035.48 with an average county size of 693.81
For state 08, the total area is 103641.89 with an average county size of 1619.4
For state 09, the total area is 4842.36 with an average county size of 605.29
For state 12, the total area is 53624.76 with an average county size of 800.37
For state 13, the total area is 57513.49 with an average county size of 361.72
For state 06, the total area is 155779.22 with an average county size of 2685.85
For state 01, the total area is 50645.33 with an average county size of 755.9
For state 17, the total area is 55518.93 with an average county size of 544.3
For state 18, the total area is 35826.11 with an average county size of 389.41
For state 19, the total area is 55857.13 with an average county size of 564.21
For state 15, the total area is 6422.63 with an average county size of 1284.53
For state 16, the total area is 82643.12 with an average county size of 1878.25
For state 20, the total area is 81758.72 with an average county size of 778.65
For state 21, the total area is 39486.33 with an average county size of 329.05
For state 22, the total area is 43203.91 with an average county size of 675.06
For state 26, the total area is 56538.9 with an average county size of 681.19
For state 27, the total area is 79626.74 with an average county size of 915.25
For state 28, the total area is 46923.27 with an average county size of 572.24
For state 23, the total area is 30842.92 with an average county size of 1927.68
For state 24, the total area is 9108.94 with an average county size of 396.04
For state 25, the total area is 7800.06 with an average county size of 557.15
For state 30, the total area is 145545.8 with an average county size of 2599.03
For state 31, the total area is 76824.18 with an average county size of 826.07
For state 32, the total area is 109781.18 with an average county size of 6457.72
For state 33, the total area is 8952.65 with an average county size of 895.26
For state 34, the total area is 7354.22 with an average county size of 350.2
For state 35, the total area is 121298.15 with an average county size of 3675.7
For state 29, the total area is 68233.73 with an average county size of 598.54
For state 37, the total area is 48617.9 with an average county size of 486.18
For state 38, the total area is 69000.8 with an average county size of 1301.9
```

```
For state 39, the total area is 40860.7 with an average county size of 464.33
For state 40, the total area is 68594.92 with an average county size of 890.84
For state 36, the total area is 47126.39 with an average county size of 760.1
For state 45, the total area is 30060.7 with an average county size of 653.49
For state 46, the total area is 75811.0 with an average county size of 1148.65
For state 47, the total area is 41234.89 with an average county size of 434.05
For state 41, the total area is 95988.01 with an average county size of 2666.33
For state 42, the total area is 44742.7 with an average county size of 667.8
For state 48, the total area is 261231.71 with an average county size of 1028.47
For state 49, the total area is 82169.62 with an average county size of 2833.44
For state 53, the total area is 66455.52 with an average county size of 1703.99
For state 54, the total area is 24038.21 with an average county size of 437.06
For state 55, the total area is 54157.8 with an average county size of 752.19
For state 56, the total area is 97093.14 with an average county size of 4221.44
For state 72, the total area is 3423.78 with an average county size of 43.89
For state 50, the total area is 9216.66 with an average county size of 658.33
For state 51, the total area is 38167.76 with an average county size of 295.87
For state 10, the total area is 1948.54 with an average county size of 649.51
For state 11, the total area is 61.05 with an average county size of 61.05
For state 44, the total area is 1033.82 with an average county size of 206.76
```