Exploring NYC Public School Test Result Scores

Importing and knowing the data

```
#importing packages

import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

# defining file path
path = "/content/drive/MyDrive/Colab Notebooks/NYC-Schools/schools.csv"

#reading information from a csv file and assigning as a dataframe to a variable
schools = pd.read_csv(path)

# DataFrame preview
print(schools.head())
print(schools.info())
```

```
                                    school_name    borough building_code  \
0  New Explorations into Science, Technology and ...  Manhattan          M022
1                           Essex Street Academy  Manhattan          M445
2                    Lower Manhattan Arts Academy  Manhattan          M445
3    High School for Dual Language and Asian Studies  Manhattan          M445
4      Henry Street School for International Studies  Manhattan          M056

   average_math  average_reading  average_writing  percent_tested
0           657              601              601             NaN
1           395              411              387            78.9
2           418              428              415            65.1
3           613              453              463            95.9
4           410              406              381            59.7
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 375 entries, 0 to 374
Data columns (total 7 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   school_name      375 non-null    object
 1   borough          375 non-null    object
 2   building_code    375 non-null    object
 3   average_math     375 non-null    int64
 4   average_reading  375 non-null    int64
 5   average_writing  375 non-null    int64
 6   percent_tested   355 non-null    float64
dtypes: float64(1), int64(3), object(3)
memory usage: 20.6+ KB
None
```

FIRST QUESTION: Which NYC schools have the best math results?

STEPS TO CALCULATE THE ANSWER

1. Calculate the threshold that defines the best math results
2. Subset the Data Frame based on the calculated threshold and show school_name and average_math, the latter sorted in descending order.
3. Assign this result to best_math_schools.
4. Print the result

Through data analysis tools, it was possible to select the schools that match the constraints and sort them in descending order.

```
# DEFINITION: The best math results are at least 80% of the maximum possible
# score of 800 for math.

threshold = 0.8 * 800

best_math_schools = schools.loc[schools['average_math'] >= threshold,
 ['school_name', 'average_math']].sort_values(by = 'average_math', ascending =
  False)

print(best_math_schools)
```

```
                                    school_name  average_math
88                          Stuyvesant High School           754
170                    Bronx High School of Science           714
```

```
93                Staten Island Technical High School          711
365  Queens High School for the Sciences at York Co...          701
68   High School for Mathematics, Science, and Engi...          683
280                    Brooklyn Technical High School          682
333                       Townsend Harris High School          680
174  High School of American Studies at Lehman College          669
0    New Explorations into Science, Technology and ...          657
45                      Eleanor Roosevelt High School          641
```

SECOND QUESTION: What are the top 10 performing schools based on combined SAT scores?

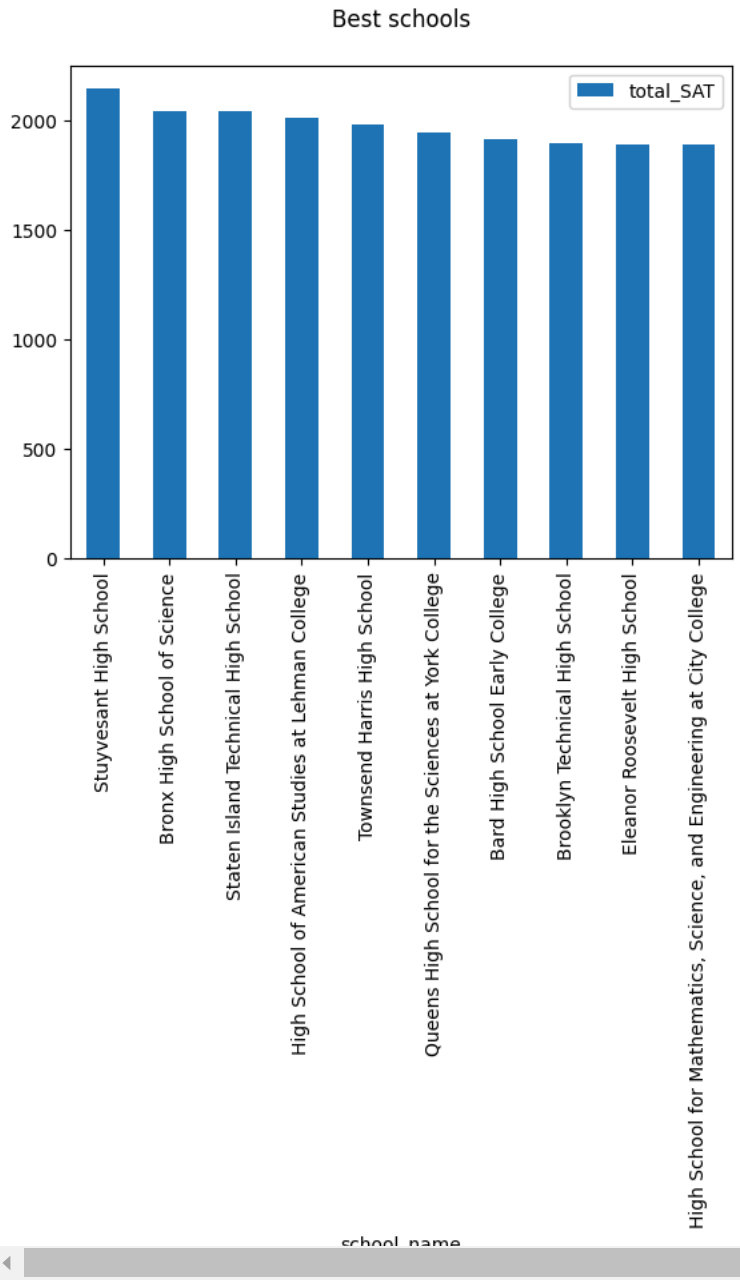
STEPS TO CALCULATE THE ANSWER

1. Create a column to store the combined SAT scores from each school.
2. Subset the Data Frame in a way that columns school_name and total_SAT will remain, the latter sorted in descending order. The rows need to be filtered from index 0 to 9 to select the top 10.
3. Assign this result to the DF: top_10_schools.
4. Print the result

Through data analysis tools, it was possible to select the best schools considering the total SAT score and sort them in descending order.

```
schools['total_SAT'] = schools['average_math'] + schools['average_reading'] + schools['average_writing']

top_10_schools = schools.sort_values(by = 'total_SAT', ascending = False).head(10)[['school_name', 'total_SAT']]

print(top_10_schools)

top_10_schools.plot(x = 'school_name', y = 'total_SAT', kind = 'bar', title = 'Best schools\n')

plt.show()
```

	school_name	total_SAT
88	Stuyvesant High School	2144
170	Bronx High School of Science	2041
93	Staten Island Technical High School	2041
174	High School of American Studies at Lehman College	2013
333	Townsend Harris High School	1981
365	Queens High School for the Sciences at York Co...	1947
5	Bard High School Early College	1914
280	Brooklyn Technical High School	1896
45	Eleanor Roosevelt High School	1889
68	High School for Mathematics, Science, and Engi...	1889



THIRD QUESTION: Which borough has the largest standard deviation in SAT scores, and what insights can we derive from it?

STEPS TO CALCULATE THE ANSWER

1. Create a column (num_schools) to store the sum of schools on each borough using agg method with a tuple (column to aggregate, aggregation function) as an argument. This command outputs a dataframe with two columns: borough and total schools for each of them.
2. Since the dataframe was already created, add a new column (average_SAT) by grouping schools dataframe based on borough and insert the mean of total_SAT column.
3. Create a column (std_SAT) to store the std dev of each school by grouping data by borough and calculating std on total_SAT column
4. Create a column ('total_SAT') to store the sum of scores from every school on the borough.
5. Sort values in descending order by using the .sort_values() method.
6. Round numeric values to two decimal places using the method Round() on the dataframe
7. redefine the dataframe to just the first row, which will give the highest std dev using the method .head(1)

8. Print the dataframe.

Through data manipulation tools, it was possible to determine that schools in Manhattan have the highest standard deviation in combined SAT scores. This indicates that Manhattan is the borough with the greatest disparity in educational quality among its schools.

Based on this result, the government could implement targeted public policies to address this issue by prioritizing investment in education for schools with the lowest scores.

```
largest_std_dev = schools.set_index('borough')

largest_std_dev = schools.groupby('borough').agg(num_schools=('borough', 'size'))
```