In [1]:
```
# Import Libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
# Set visualization styles
sns.set(style="whitegrid")
```

In [3]:
```
# Read in the data
schools = pd.read_csv("schools.csv")
```

In [4]:
```
# Preview the dataset
print("Dataset Preview:")
schools.head()
```

```
Dataset Preview:
```

Out[4]:

	school_name	borough	building_code	average_math	average_reading	average_
0	New Explorations into Science, Technology and ...	Manhattan	M022	657	601	
1	Essex Street Academy	Manhattan	M445	395	411	
2	Lower Manhattan Arts Academy	Manhattan	M445	418	428	
3	High School for Dual Language and Asian Studies	Manhattan	M445	613	453	
4	Henry Street School for International Studies	Manhattan	M056	410	406	

SECTION 1: NYC Schools with Best Math Results

In [6]:
```
print("\nBest Performing Schools in Math (>= 80% of 800):")
best_math_schools = schools[schools['average_math'] >= 0.8 * 800]
best_math_schools = best_math_schools.sort_values('average_math', ascending=
best_math_results = best_math_schools[['school_name', 'average_math']]
best_math_results.head(10)
```

```
Best Performing Schools in Math (>= 80% of 800):
```

Out[6]:

	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

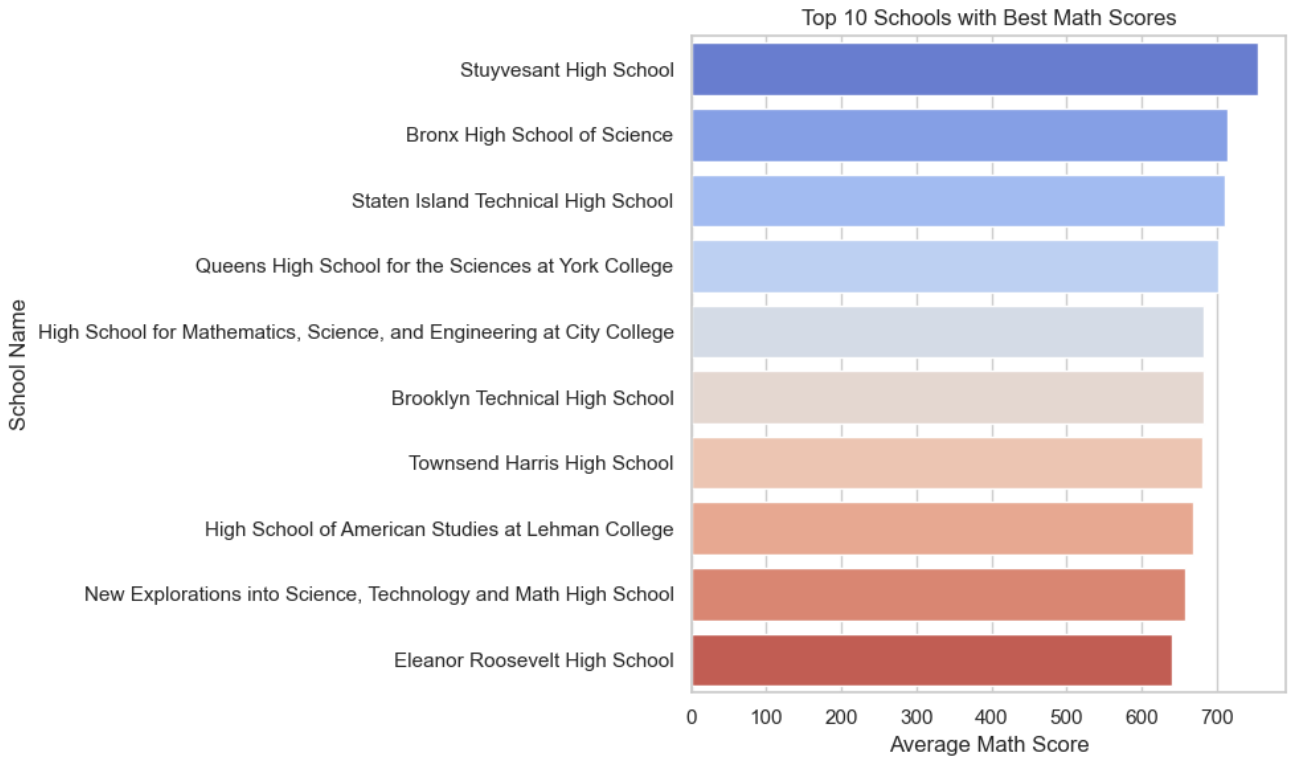
Visualization: Top 10 Math Scores

In [8]:
```
plt.figure(figsize=(10, 6))
sns.barplot(data=best_math_results.head(10), x='average_math', y='school_nam
plt.title("Top 10 Schools with Best Math Scores")
plt.xlabel("Average Math Score")
plt.ylabel("School Name")
plt.tight_layout()
plt.savefig("top_math_scores.png")
plt.show()
```

```
/var/folders/17/y6yqqy7n54j29b_bxf1w8h880000gn/T/ipykernel_69892/1463068675.
py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed
in v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for the
same effect.

  sns.barplot(data=best_math_results.head(10), x='average_math', y='school_n
ame', palette="coolwarm")
```



SECTION 2: Top 10 Schools Based on Combined SAT Scores

In [10]:
```
schools['total_SAT'] = schools['average_math'] + schools['average_reading']
top_10_schools = schools.sort_values('total_SAT', ascending=False).head(10)
print("\nTop 10 Schools by Combined SAT Scores:")
top_10_schools[['school_name', 'total_SAT']]
```

```
Top 10 Schools by Combined SAT Scores:
```

Out[10]:

	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

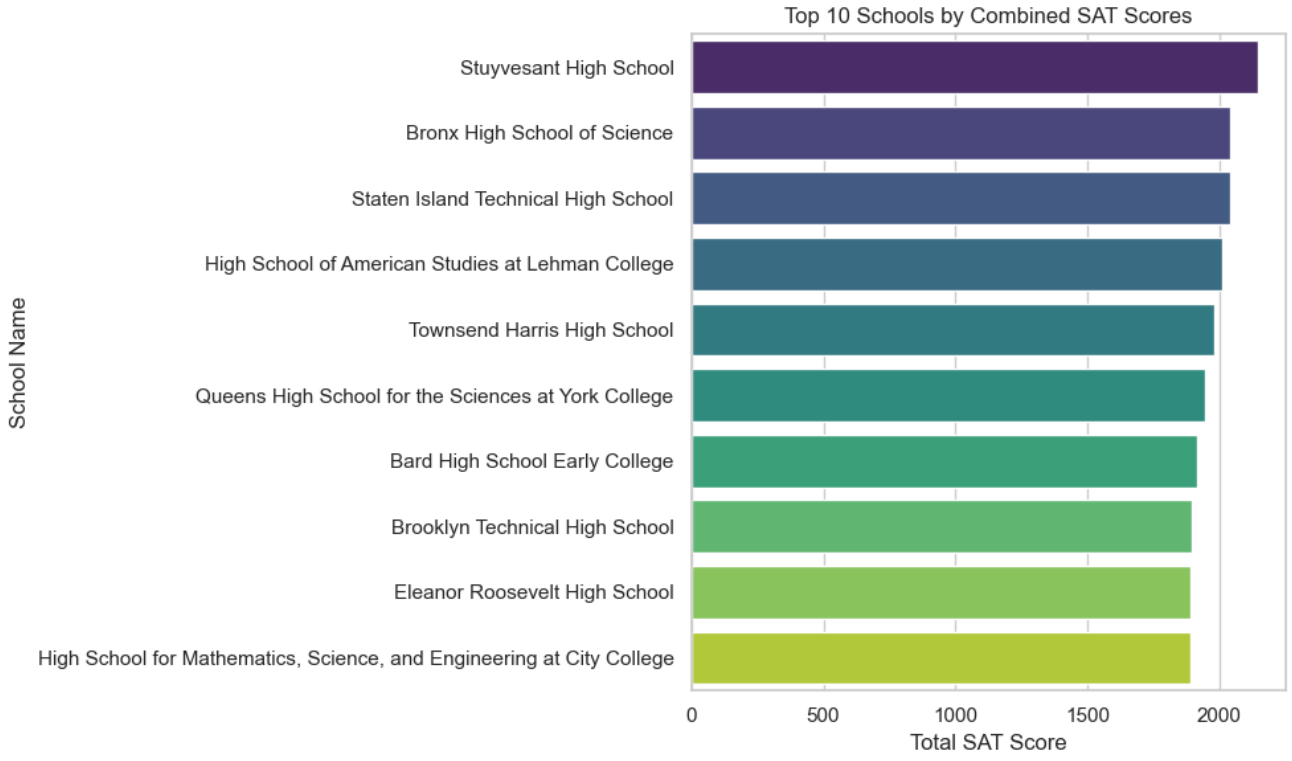
Visualization: Top 10 Combined SAT Scores

In [11]:
```
plt.figure(figsize=(10, 6))
sns.barplot(data=top_10_schools, x='total_SAT', y='school_name', palette="vi
plt.title("Top 10 Schools by Combined SAT Scores")
plt.xlabel("Total SAT Score")
plt.ylabel("School Name")
plt.tight_layout()
plt.savefig("top_combined_scores.png")
plt.show()
```

```
/var/folders/17/y6yqqy7n54j29b_bxf1w8h880000gn/T/ipykernel_69892/999765075.p
y:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed
in v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for the
same effect.

  sns.barplot(data=top_10_schools, x='total_SAT', y='school_name', palette="
viridis")
```



SECTION 3: Borough with the Largest SAT Score Standard Deviation

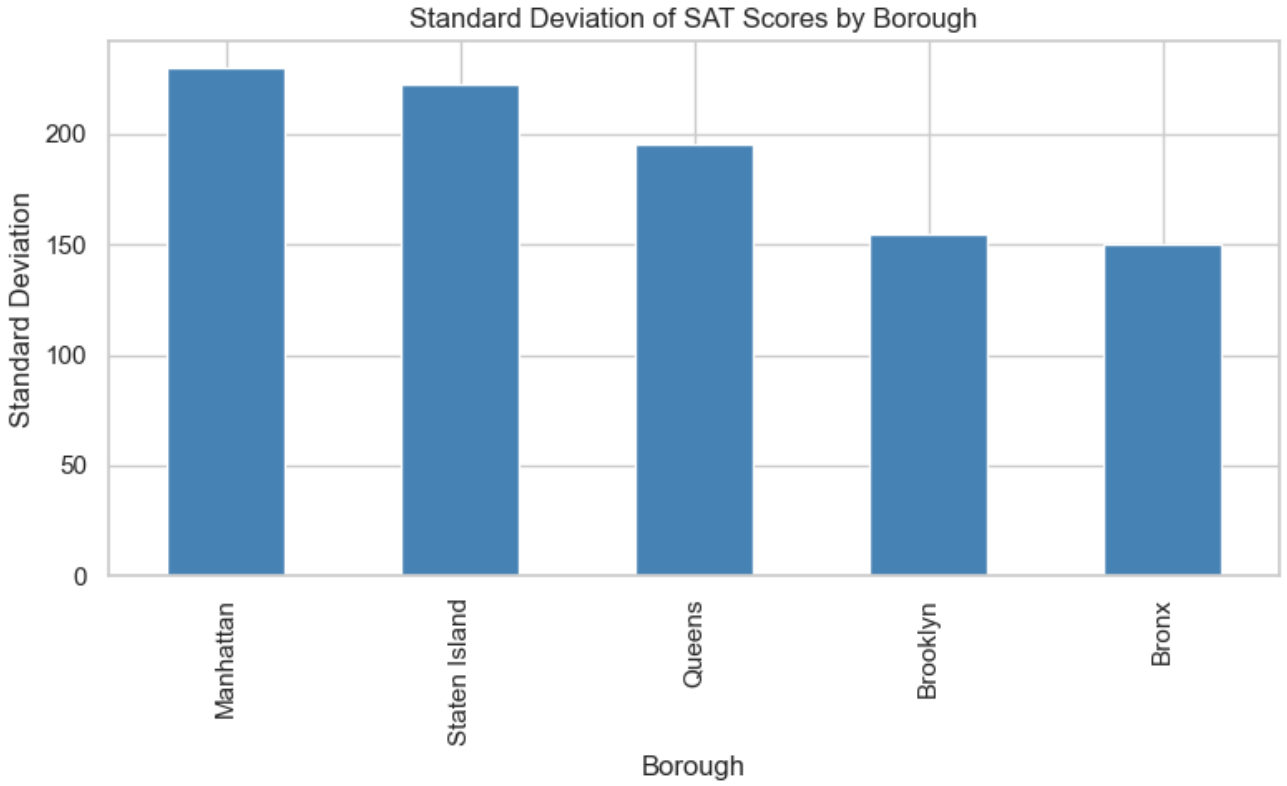
In [13]:
```
borough_stats = schools.groupby('borough')['total_SAT'].agg(['count', 'mean'
largest_std_borough = borough_stats.loc[borough_stats['std'].idxmax()]
print("\nBorough with Largest Standard Deviation in SAT Scores:")
largest_std_borough
```

```
Borough with Largest Standard Deviation in SAT Scores:
```

Out[13]:
```
count      89.00
mean     1340.13
std       230.29
Name: Manhattan, dtype: float64
```

Visualization: Borough SAT Statistics

In [14]:
```
plt.figure(figsize=(8, 5))
borough_stats.sort_values('std', ascending=False)['std'].plot(kind='bar', co
plt.title("Standard Deviation of SAT Scores by Borough")
plt.xlabel("Borough")
plt.ylabel("Standard Deviation")
plt.tight_layout()
plt.savefig("borough_sat_std.png")
plt.show()
```



Average Math Score per Borough

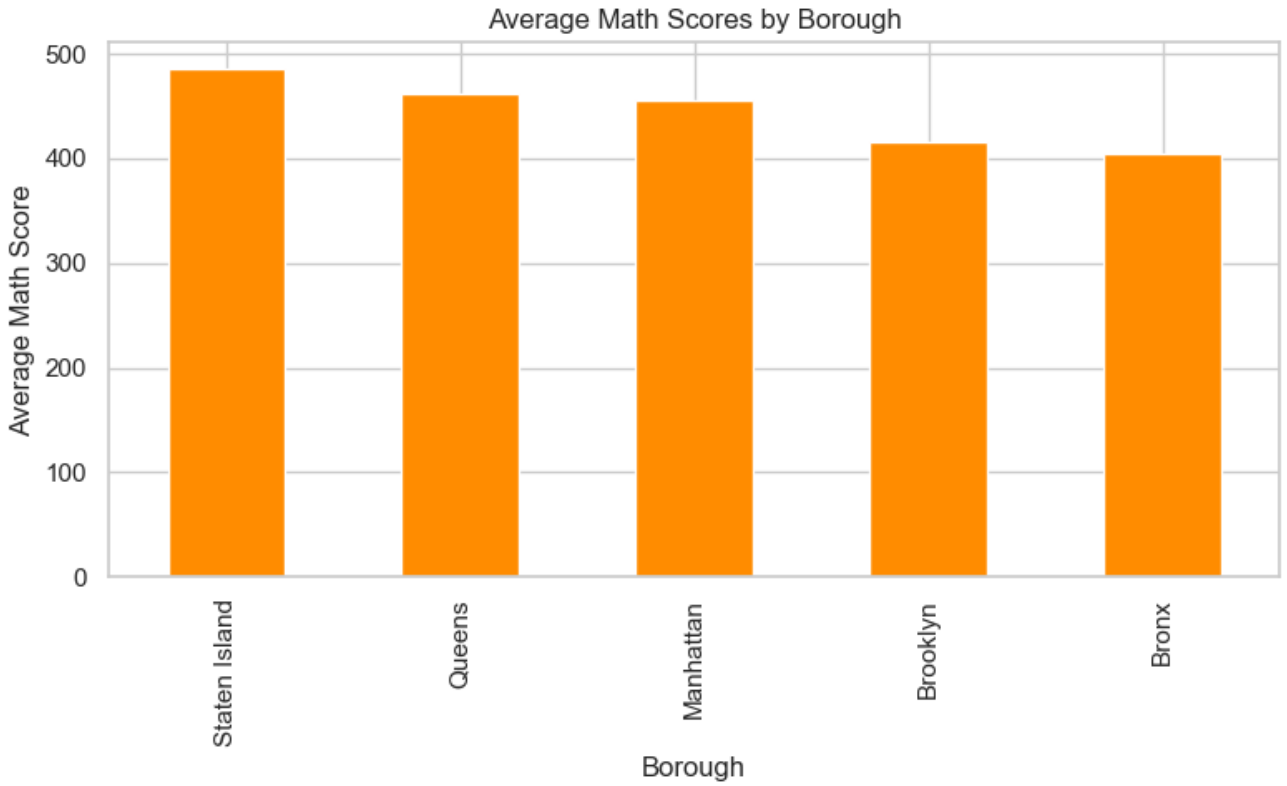
In [17]:
```
avg_math_borough = schools.groupby('borough')['average_math'].mean().round(2
print("\nAverage Math Scores by Borough:")
avg_math_borough
```

```
Average Math Scores by Borough:
```

Out[17]:
```
borough
Bronx            404.36
Brooklyn         416.40
Manhattan        455.89
Queens           462.36
Staten Island    486.20
Name: average_math, dtype: float64
```

Visualization: Average Math Scores by Borough

In [18]:
```
plt.figure(figsize=(8, 5))
avg_math_borough.sort_values(ascending=False).plot(kind='bar', color='darkor
plt.title("Average Math Scores by Borough")
plt.xlabel("Borough")
plt.ylabel("Average Math Score")
plt.tight_layout()
plt.savefig("avg_math_borough.png")
plt.show()
```



Schools with Above Average Total SAT Scores

In [20]:
```
overall_avg_sat = schools['total_SAT'].mean()
above_avg_schools = schools[schools['total_SAT'] > overall_avg_sat]
print("\nSchools with Above Average SAT Scores:")
above_avg_schools[['school_name', 'total_SAT']].head(10)
```

```
Schools with Above Average SAT Scores:
```

Out[20]:

	school_name	total_SAT
0	New Explorations into Science, Technology and ...	1859
3	High School for Dual Language and Asian Studies	1529
5	Bard High School Early College	1914
10	Pace High School	1292
11	High School for Health Professions and Human S...	1327
12	High School for Language and Diplomacy	1290
14	Institute for Collaborative Education	1592
15	Gramercy Arts High School	1360
16	Urban Assembly New York Harbor School	1327
18	Millennium High School	1704

Correlation Between SAT Sections

In [22]:
```
correlations = schools[['average_math', 'average_reading', 'average_writing'
print("\nCorrelation Between SAT Sections:")
correlations
```

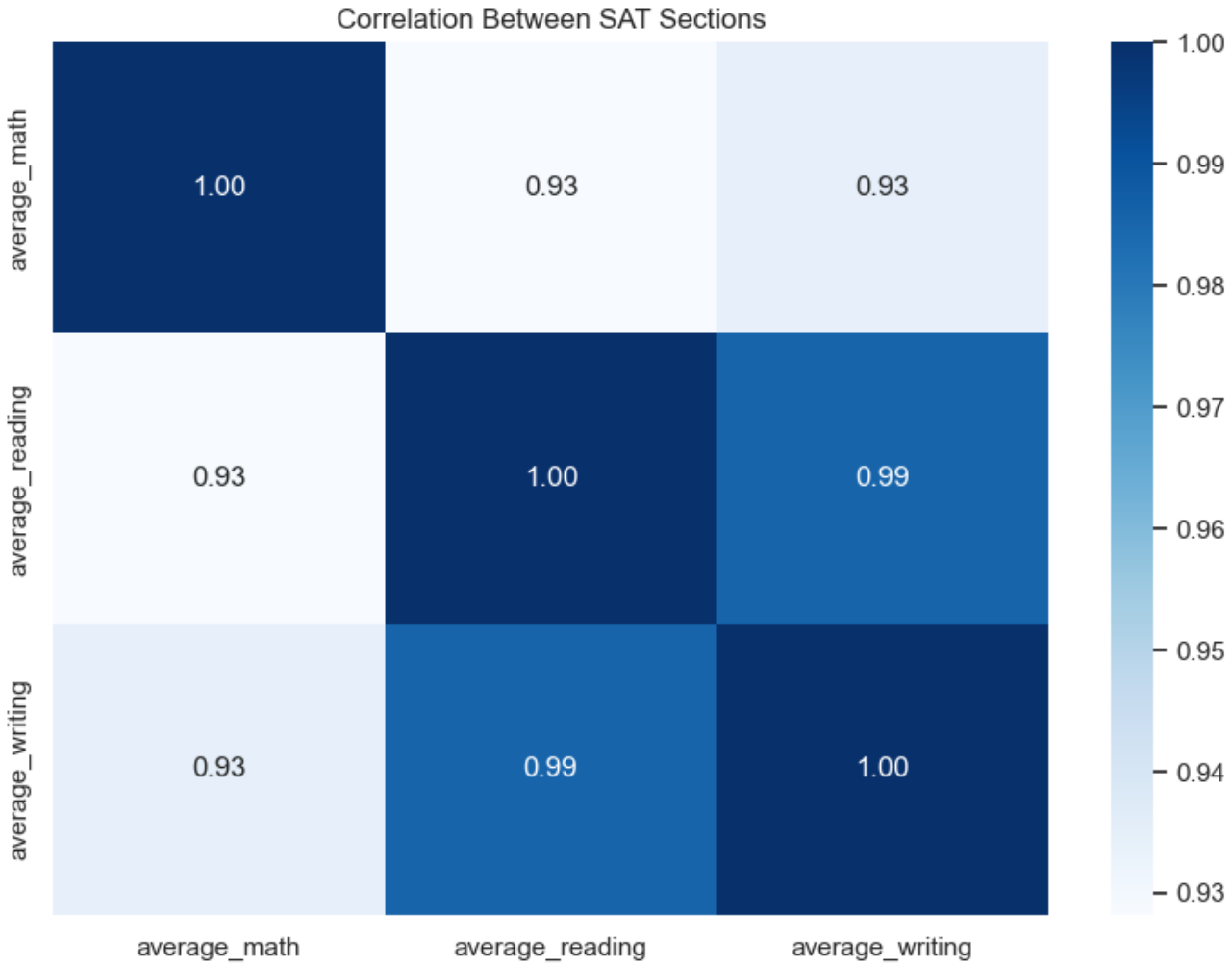
```
Correlation Between SAT Sections:
```

Out[22]:

	average_math	average_reading	average_writing
average_math	1.000000	0.928239	0.934155
average_reading	0.928239	1.000000	0.985439
average_writing	0.934155	0.985439	1.000000

Visualization: Heatmap of SAT Section Correlations

In [23]:
```
plt.figure(figsize=(8, 6))
sns.heatmap(correlations, annot=True, cmap="Blues", fmt=".2f")
plt.title("Correlation Between SAT Sections")
plt.tight_layout()
plt.savefig("sat_correlation.png")
plt.show()
```


Correlation Between SAT Sections
average_math
average_reading
average_writing
1.00
0.93
0.93
0.93
1.00
0.99
0.93
0.99
1.00
average_math
average_reading
average_writing
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93