problem4

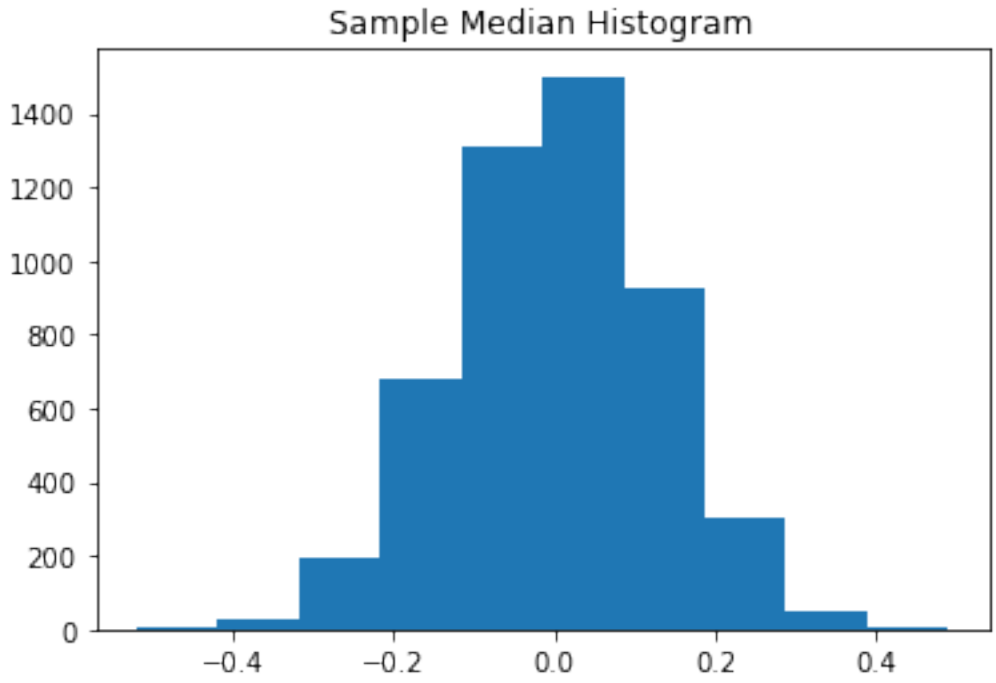
February 15, 2022

0.1 Problem 4

[1]:
```
import numpy as np
from numpy.random import standard_normal
import matplotlib.pyplot as plt
```

[2]:
```
x = standard_normal((5000, 99))
sorted_x = np.sort(x, axis=1)
medians = sorted_x[:, 49]
```

[3]:
```
plt.hist(medians)
plt.title("Sample Median Histogram")
plt.show()
```



[4]:
```
std = np.std(medians)
print("standard deviations of medians: ", std)
```

```
standard deviations of medians:  0.12797205979697948
```

The theoretical standard deviation of the sample means is $\frac{1}{\sqrt{99}} \approx 0.1005$. According to our simulation, the sample median is more variable than the sample mean.