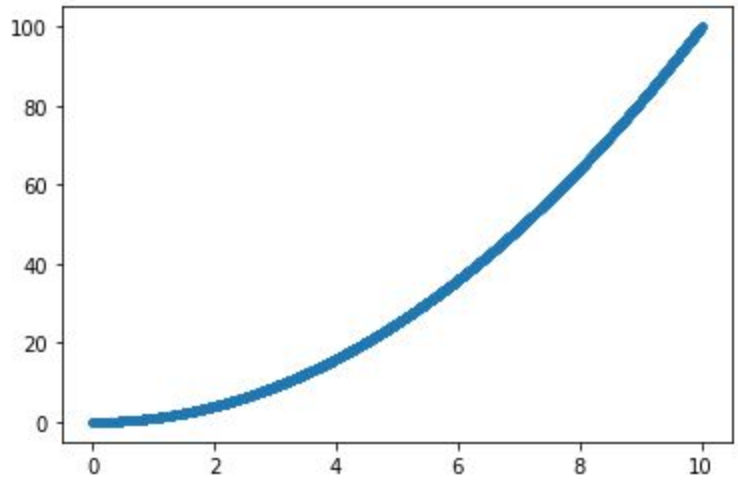
Jessica Hamilton
Exercise 11
Mean Value Method

The Initial run:
Given how we approached the function, the graph of the x and y values generated makes sense and it is what is expected. When running the function several times, the output value varies a quite a bit more than I thought it would.The output value ranges from 315 to 341 whereas the analytical value is 333.333.. in the several times I ran the code. See example output below.

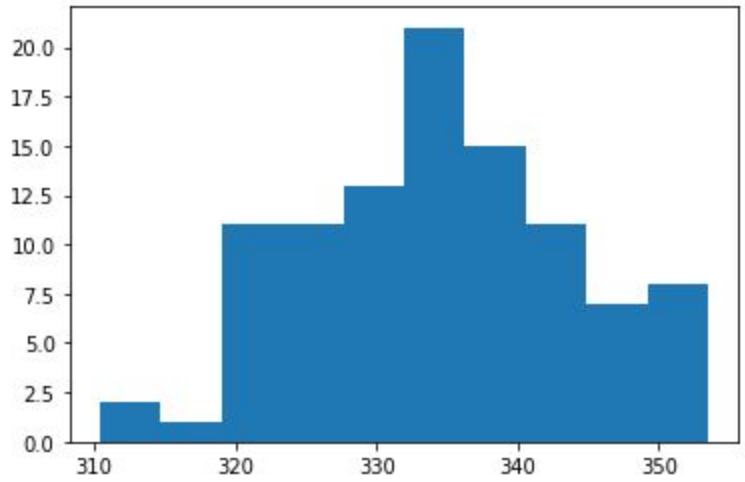


This is the approx value: 330.9569898185646

When increasing the sampling size to 10000, it actually brought the overall output to a more acceptable value. It actually decreases the error. The value ranges from 329 to 339 the several times I ran the code.

For the 100 runs:
The mean and median values are relatively close to the analytical value where It is difficult to say which, mean or median, is better at estimating the actual value of the integral. There is still the spread in values with just using 1000 samples. See results and histogram below.

Mean value of 100 runs: 334.2775610755918
Median value of 100 runs: 334.446924047341
Error in 100 trials: 9.475131141475977
book version for error: 3.162277660168379
error for large N: 0.03162277660168379



The two different values for the standard deviation are quite different
than my calculated value for the standard deviation
When comparing to the approach taken in exercise nine, This method seems much easier and the values are close, but sometimes it does oversample it seems. This is most likely a coding error. The example shown above indicates this, but other simulations I ran do not indicate this, such as the one below.

Mean value of 100 runs: 332.98766698884737
Median value of 100 runs: 331.7015653875654
Error in 100 trials: 9.759860114293893
book version for error: 3.162277660168379
error for large N: 0.03162277660168379