Monte Carlo Integration

The famous 'hit or miss' method for integration does not require a long program. Try to solve the following integral:

$$I = \int_0^2 sin^2 \frac{1}{x(2-x)} dx$$

The function behaves round x=1 quite regular but near x=0 and x= 2 it start to oscillate. However the integral is certainly finite and less than 2. The Monte Carlo method is very suitable for this.
In Python just write a function with the function after the integral sign. Use the numpy.random functions to generate x values in the correct range and a random value for y. Count the values which are 'hits' and use them to calculate the approximation for I.
You can extend your program to calculate the error.
A more common Monte Carlo method is to use mean values. Try to do this too.
A typical result for the integral above should give you 1.4422 for the first method and 1.4413 for the second method.