The goal of this homework is to write a code which approximates a definite integral $\int_a^b f(x) \, dx$ by the Monte Carlo method where $f(x) \geq 0$ for $x \in [a, b]$. 

1. Modify your code for approximating $\pi$ using a Monte Carlo approach to approximate the integral

$$\int_0^\pi \sin x \, dx$$

2. Run the code for $n = 10, 100, 1000, 10000, 100000$ points and make a table with $n$, your approximation and your error. You can make this table by hand for now.

3. After Lecture 5 you will know how to write a function for $f(x)$ instead of “hardwiring” it into your code. Do this and use it to repeat #2 for the integral

$$\int_1^2 e^x \, dx$$

Submit this final code plus your two tables.