Assignment: Module 13 Name: Hoyoung kim

Disclaimer: This is my work, not that of others

Total Score: 20

1. 10
2. 10

1. (10 pt) Evaluate ∬𝑒𝑥2𝑦2𝑅𝑑𝑥𝑑𝑦 where the region of integration, 𝑅, is the unit circle in the *x-y* plane. Use 1,000,000 points inside the unit circle to estimate the integral. Use the function average technique or type 1 Monte Carlo simulation.

Notes:

1. a. Generate pairs of random number (𝑥,𝑦) only keep the pairs that satisfy 𝑥2+𝑦2≤1. You may need more than 1,000,000 pairs to get the required set.
2. b. The area of the unit circle is ∬𝑑𝑥𝑑𝑦=𝜋𝑅.

Using sets of 2 random number, and doing a natural log evaluation. This was done with python and then adding up all the average, I was able to find that the integral of area of the circle is 3.280147633754156… and continued

2. (10 pt) Find the volume of the 3-d region bounded by the following equations using dart throwing, type 2 Monte Carlo simulation, with 1,000,000 points.

0<𝑥<1,0<𝑦<1,0<𝑧<1

𝑥^2+sin^2𝑦≤𝑧,

𝑥−𝑧+𝑒^𝑦≤1

With python I was able to generate 3 lists of 1000000 random numbers , then using the halton algorithm, I was able to find the volume of the 3-d region in dart throwing. This was done by using monte carlo simulation of the region and the answer that the code returned was 0.136527 when using counter on

x\*\*2 + math.sin(y)\*\*2 <= z and x - z + math.exp(y) <= 1