Mathematical Skills for Data Scientists
Lab Exercises 7 – 5 Marks (Due: 12/11/22)

Gibin Powathil

g.g.powathil@swansea.ac.uk

Exercise 1. Write a routine that takes as input a function f and a natural number N, then generates N random numbers x_i between 0 and 1 and computes the average of all function values $f(x_i)$. Compare the result to $\int_0^1 f(x)dx$. (marks 2)

Exercise 2. Write a function that generates points in the unit square (points (x, y) with $0 \leq x \leq 1, 0 \leq y \leq 1$) uniformly at random, and keeps track of which fraction of them are within a distance of 1 from the origin. What does this Monte-Carlo method compute? (marks 2)

Exercise 3. Download the data1 file from the assignment portal. Calculate the mean and standard deviation of the data set.

Assuming the data is normally generated, how many values would exceed 300? How many values would be negative?

Compare this to how many values actually exceed 300 and how many actually are negative, and comment on any discrepancies. (marks 1)