Assignment 6

- Use either C/C++ or Python for your program.

- Include the integration functions in your library. Don't re-write them in your main program.

- Append your final results, *i.e.* just the answer, at the end of the codes as usual.

- Plotting of your data is involved in the problems below. Use your favorite plotter to produce eps or pdf plots. Symbols and axes must be clearly marked and labeled. Upload the plots along with your codes.

- No appended results = -1; no plots = -1

1. Codes for Midpoint, Trapezoidal and Simpson numerical integration technique in your library. [**4**]

2. Numerically integrate the following using Midpoint, Trapezoidal and Simposn techniques for $N = 5$, 10 and 25 and compare the result (in tabular format) with the actual analytical result. [**1.5**]

$$\int_1^3 \frac{x}{1+x}\, dx$$

3. Numerically integrate the following using Midpoint, Trapezoidal and Simpson techniques with maximum error of 0.001. [**1.5**]

$$\int_0^1 e^{-x^2}\, dx$$

4. Use Monte Carlo to estimate the value of π from the following integral

$$\int_0^1 \frac{4}{1+x^2}\, dx = \pi$$

Use system built random number generator and sample N starting from 10 and keep increasing in multiple of 10. Go as far as possible within a reasonable time. Plot π vs. N. [**3**]