Exercise 10

1. Evaluate the following integral:

$$\int_{-2}^{4} (1 - x - 4x^3 + 2x^5)\, dx$$

   (a) analytically;

   (b) single segment of the trapezoidal rule;

   (c) multiple segment of the trapezoidal rule, n = 4;

   (d) single segment of Simpson's 1/3 rule;

   (e) multiple segment of Simpson's 1/3 rule, with n = 4;

   (f) single segment of Simpson's 3/8 rule;

   (g) multiple segment of Simpson's 3/8 rule using n = 4;

   (h) print the absolute of relative true error of the answer of (b) until (g)

2. Use the same function as the question number 1 to answer the following questions:

   (a) Use Gaussian quadrature approach to calculate the numerical integration of the function using 3 points. Use the constants in the presentation materials to solve the problem. Answer this problem in your paper (not a python program).
   (b) Create a python program for numerical integration using Gaussian quadrature rule where the number points is the parameter (from 2 until 6). Use the constants in the presentation for the reference. Print out the solution with number of points = 2 until 6 complete with the absolute relative true error.