Lab-7

Problem

$$F(x, y, z) = ax^2 + by^3 + cz^{0.5},$$

$$R = \int_{x_{min}}^{x_{max}} \int_{y_{min}}^{y_{max}} \int_{z_{min}}^{z_{max}} F(x, y, z) \; \mathrm{d}x\mathrm{d}y\mathrm{d}z$$

R_1 – Analytic result
R_2 – Uniform grid integral
R_3 – Monte-Carlo integration

Parameters

$$a = 1, \quad b = 0.5, \quad c = 2.$$

$$x_{min} = -5 \;, \quad x_{max} = 5 \;,$$

$$y_{min} = -5 \;, \quad y_{max} = 5 \;,$$

$$z_{min} = 1 \;, \quad z_{max} = 10 \;,$$

Task

One m-file per task:

1. Calculate R_2 for $N = 100, 200, 500$.

2. Calculate R_3 for $N = 300, 600, 1500$

3. Plot on the single graph $R1$, $R2(N, N, N)$, $R3(3N)$ vs N where $N = (50, 100, 200, 300, 400, 500)$