MTH 210: Lab 5

P 1. Suppose you want to draw samples from $N(0,1)$ using Ratio of Uniforms method. Derive the appropriate set D. Using this set D generate samples from $N(0,1)$.

P 2. Using simple Monte Carlo sampling, evaluate the following integrals and compare it with the analytically obtained value:

$$\int_0^1 e^x = e - 1. \tag{1}$$

$$\int_0^\pi \left(\sqrt{x^3 + \sqrt{x}} - x^2 \sin(4x)\right) dx = \frac{\pi^2}{4} + \frac{2}{5}\left(\pi^{\frac{5}{4}} \sqrt{1 + \pi^{\frac{5}{2}}} + \sinh^{-1}(\pi^{\frac{5}{4}})\right) \tag{2}$$