PROBLEM SET 6: APPROXIMATE INTEGRATION

Note: Most of the problems were taken from the textbook [1].

Problem 1. *Use the Trapezoidal Rule to approximate the given integrals with* $n = 10$*:*

a) $\int_1^2 \sqrt{x^3 - 1}\, dx$

b) $\int_0^2 \frac{e^x}{1+x^2}\, dx$

c) $\int_2^3 \frac{dx}{\ln x}$

Problem 2. *Use the Midpoint Rule to approximate the given integrals with* $n = 8$*:*

a) $\int_0^4 x^3 \sin x\, dx$

b) $\int_0^4 \sqrt{x} \cos x\, dx$

c) $\int_0^4 \ln(1 + e^x)\, dx$

Problem 3. *Use the Simpson's to approximate the given integrals with* $n = 4$*:*

a) $\int_0^{\pi/2} \sqrt[3]{1 + \cos x}\, dx$

b) $\int_1^3 \frac{\sin x}{x}\, dx$

Problem 4. *How large should* n *be to guarantee that the Simpson's Rule approximation to* $\int_0^1 e^{x^2} dx$ *is accurate to within* 0.00001*?*

References

[1] J. Stewart: *Single Variable Calculus* 8th Edition, Cengage Learning, Boston 2015.