Assignment 2

Exercise 0.0.1 *The velocity (m/s) of water flowing through a pipe at time t seconds is given by the following table:*

t	0	2	4	6	8	10	12
$v(t)$	0	6.2	8.5	9.0	8.0	6.5	0

Estimate the total distance travelled by the water in 12 seconds using:

a) Trapezoidal Rule

b) Simpson's 1/3 Rule

c) Simpson's 3/8 Rule

Exercise 0.0.2 *Use all three methods (Trapezoidal, Simpson's 1/3, Simpson's 3/8) to estimate the area under the curve:*

$$y = \sqrt{x^3 + 1}, \quad x \in [1, 4]$$

with $n = 6$.

Exercise 0.0.3 *Evaluate the following using Simpson's 3/8 Rule with $n = 6$:*

$$K = \int_2^5 \frac{1}{x^2 + 1} dx$$

a) Compute all function values at the required nodes.

b) Compare your result with the exact (analytical) value $\left(\text{ Use } \int \frac{1}{x^2+1} dx = \tan^{-1} x + C \right)$.