Practical Programming Exam

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We check if the values given for the weights of the 3-point trapezium rule is indeed correct. The given values are $w_i = 3/8, 2/8, 3/8$ for the abscissas: $x_i = 1/6, 3/6, 5/6$, respectively.

The approximate integral is given as:

$$\int_a^b f(x)dx = w_1x_1 + w_2x_2 + w_3x_3 \tag{1}$$

Assuming that a low order polynomial can approximate the function f, we therefore have the three equations:

$$\int_a^b dx = (b-a) = w_1x_1 + w_2x_2 + w_3x_3 \tag{2}$$

$$\int_a^b xdx = \frac{b^2-a^2}{2} = w_1x_1 + w_2x_2 + w_3x_3 \tag{3}$$

$$\int_a^b x^2dx = \frac{b^3-a^3}{3} = w_1x_1 + w_2x_2 + w_3x_3 \tag{4}$$

Inserting our assumed abscissas we find that the weights $w_i = 3/8, 2/8, 3/8$ indeed is a solution to this system of equations.