

Question 1

Given

$$f(0) = 1, f(1) = 2, f(2) = 5, f(3) = 10, f(4) = 17,$$

use T_4 to approximate $\int_0^4 f(x) dx$.

Question 1 – Solution

Step 1: Find the subinterval width.

$$h = \frac{b - a}{n} = \frac{4 - 0}{4} = 1.$$

Step 2: Write the trapezoidal formula.

$$T_4 = \frac{h}{2} [f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4)].$$

Step 3: Substitute the table values.

$$\begin{aligned} T_4 &= \frac{1}{2} [1 + 2(2) + 2(5) + 2(10) + 17] \\ &= \frac{1}{2} [1 + 4 + 10 + 20 + 17] \\ &= \frac{1}{2} (52) = 26. \end{aligned}$$

$$\boxed{T_4 = 26}$$