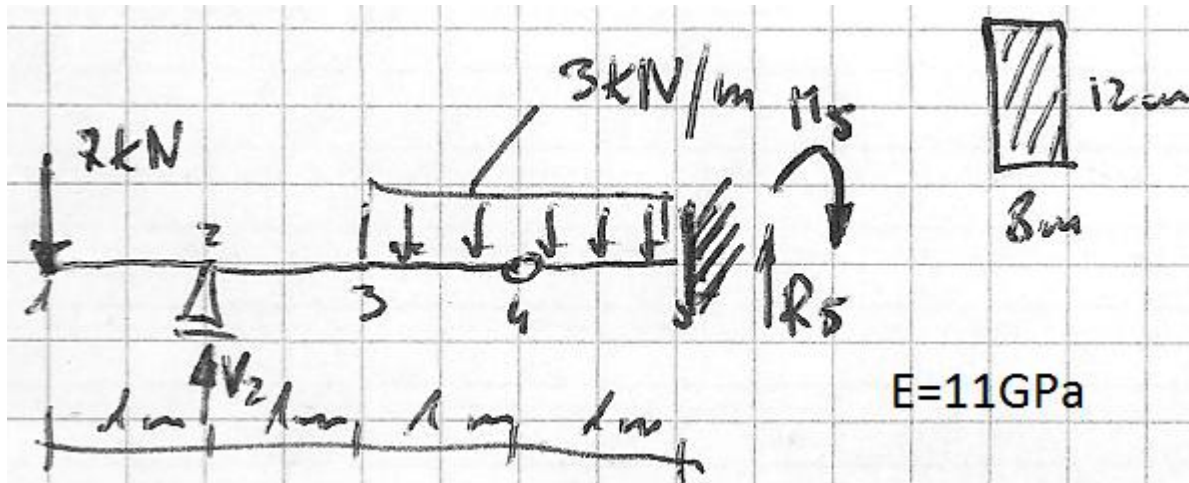


ORIGIN := 0



$$q := 3 \frac{\text{kN}}{\text{m}} \quad P := 7 \text{ kN}$$

$$\underline{L} := 4 \text{ m} \quad b := 8 \text{ cm} \quad h := 12 \text{ cm} \quad \underline{J} := b \cdot \frac{h^3}{12} \quad E := 11 \text{ GPa}$$

$$R2 := \frac{q \cdot 1 \text{ m} \cdot 0.5 \text{ m} + P \cdot 3 \text{ m}}{2 \text{ m}}$$

$$R2 = 11.25 \cdot \text{kN}$$

$$T4 := q \cdot 1 \text{ m} - R2 + P$$

$$T4 = -1.25 \cdot \text{kN}$$

$$M5 := q \cdot 1 \text{ m} \cdot 0.5 \text{ m} + T4 \cdot 1 \text{ m}$$

$$M5 = 0.25 \text{ m} \cdot \text{kN}$$

$$R5 := q \cdot 2 \text{ m} + P - R2$$

$$R5 = 1.75 \cdot \text{kN}$$

$$n := 4 \quad \Delta := \frac{L}{n} = 1 \text{ m}$$

$$\alpha := \frac{\Delta^2}{E \cdot J}$$

$$\alpha = 7.891 \times 10^{-3} \cdot \frac{1}{\text{kN}}$$

$$M1(x) := -P \cdot x$$

$$M2(x) := M1(x) + R2 \cdot (x - 1\text{m})$$

$$M3(x) := M2(x) - q \cdot \frac{(x - 2\text{m})^2}{2}$$

$$i := 0 \ldots n \qquad X_i := i \cdot \Delta$$

$$i := 0 \ldots 1 \qquad M_i := M1(X_i)$$

$$i := 1 \ldots 2 \qquad M_i := M2(X_i)$$

$$i := 2 \ldots n \qquad M_i := M3(X_i)$$

M =

| | |
|---|-------|
| | 0 |
| 0 | 0 |
| 1 | -7 |
| 2 | -2.75 |
| 3 | 0 |
| 4 | -0.25 |

· kN · m

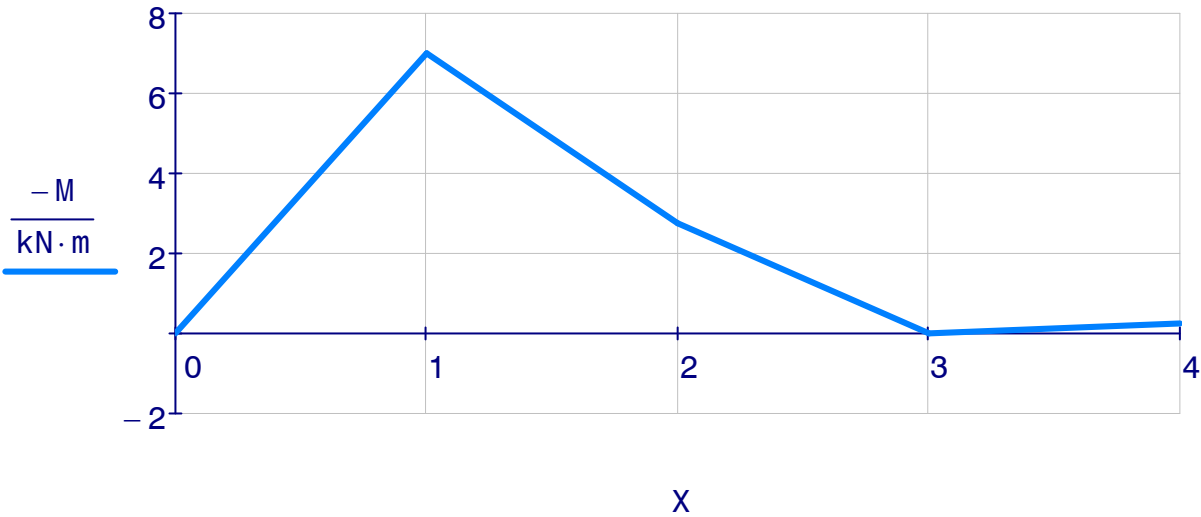
X =

| | |
|---|---|
| | 0 |
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |

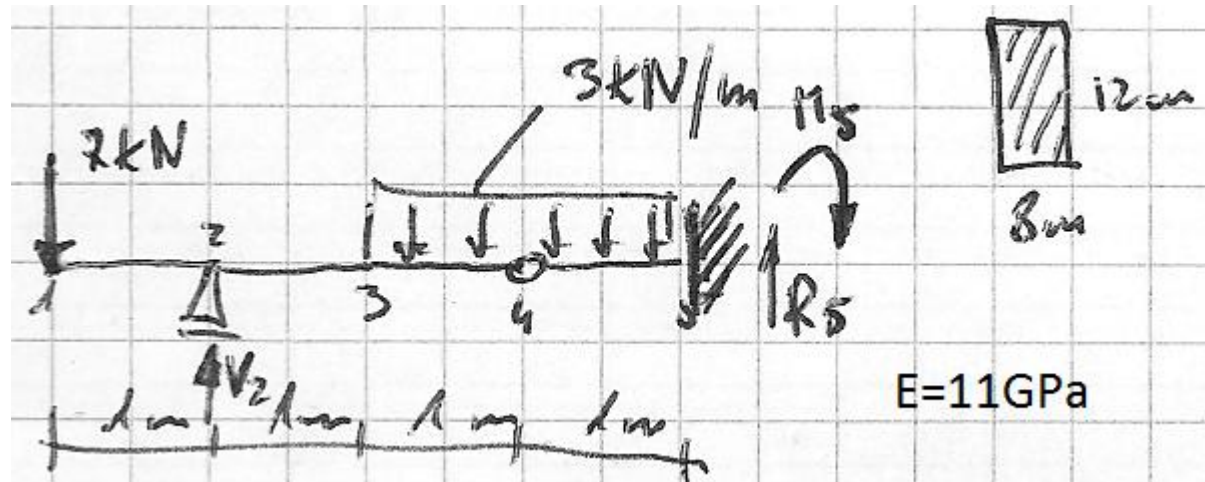
m

Układ równań metody różnic skończonych

$$A \cdot y = \alpha \cdot M$$



$$A := \begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 1 & -2 & 1 & 0 & 0 \\ 0 & 1 & -2 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 2 & 0 \end{pmatrix}$$



$$y := \text{lsolve}(A, \alpha \cdot M)$$

$$y = \begin{pmatrix} -65.597 \\ 0 \\ 10.357 \\ -0.986 \\ 0 \end{pmatrix} \cdot \text{mm}$$

