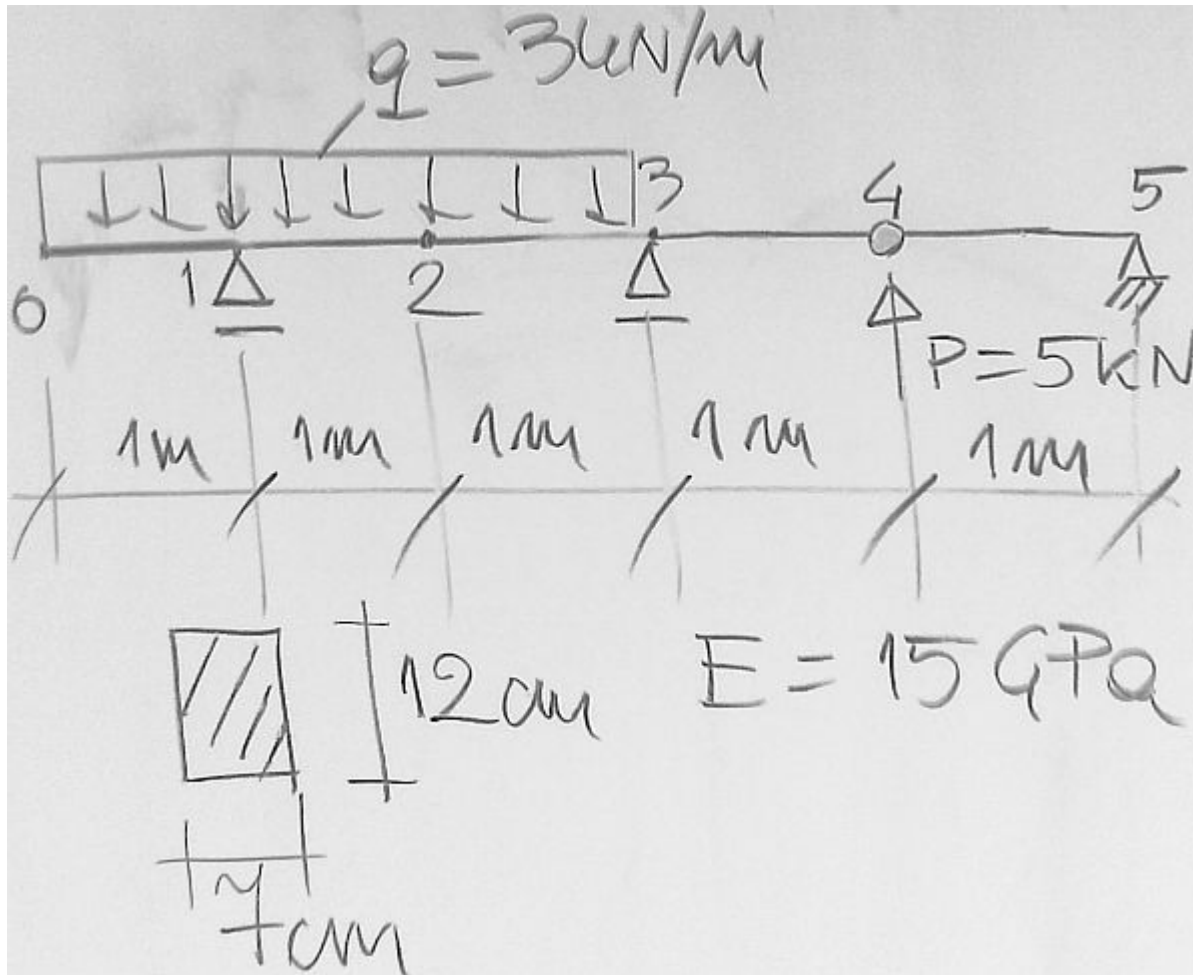


## Metoda różnic skończonych - ugięcie belki



$$R_5 := 0 \quad R_1 := \frac{q \cdot 3\text{m} \cdot 1.5\text{m} + P \cdot 1\text{m}}{2\text{m}}$$

$$P := 5 \text{ kN} \quad q := 3 \frac{\text{kN}}{\text{m}} \quad E := 15 \text{ GPa}$$

$$b := 7 \text{ cm} \quad h := 12 \text{ cm}$$

$$L := 5 \text{ m} \quad J := b \cdot \frac{h^3}{12} = 1008 \cdot \text{cm}^4$$

$$n := 5 \quad \Delta := \frac{L}{n} = 1 \text{ m}$$

$$\alpha := \frac{\Delta^2}{E \cdot J} = 6.61376 \cdot \frac{1}{\text{MN}}$$

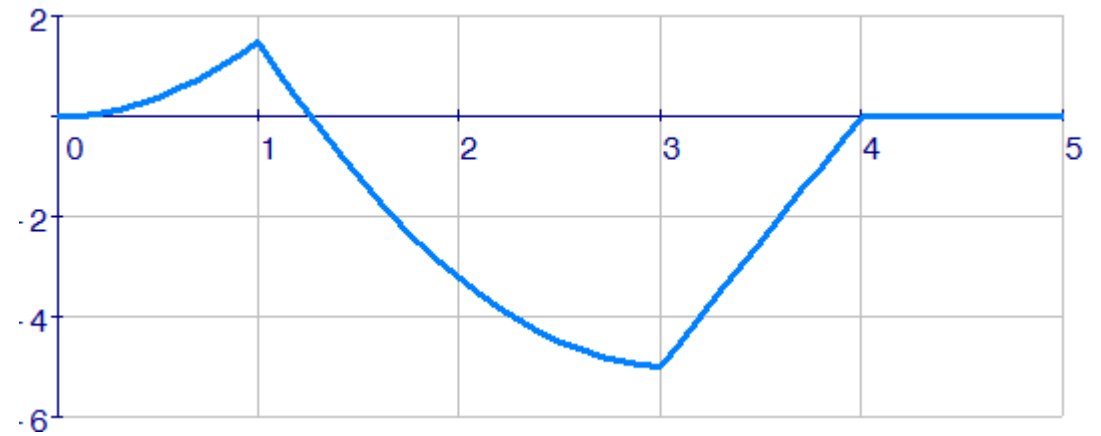
dokładność  $y \pm 0.005 \text{ mm}$

$$M_1(x) := -q \cdot \frac{x^2}{2}$$

$$M_2(x) := M_1(x) + R_1 \cdot (x - 1\text{m})$$

$$M_3(x) := P \cdot (4\text{m} - x)$$

$$M = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0 \\ \hline 1 & -1.5 \\ \hline 2 & 3.25 \\ \hline 3 & 5 \\ \hline 4 & 0 \\ \hline 5 & 0 \\ \hline \end{array} \cdot \text{kN} \cdot \text{m} \quad X = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0 \\ \hline 1 & 1 \\ \hline 2 & 2 \\ \hline 3 & 3 \\ \hline 4 & 4 \\ \hline 5 & 5 \\ \hline \end{array} \text{m}$$



*Warunki brzegowe*

$$y_1 = 0 \quad y_3 = 0 \quad y_5 = 0$$

$$\alpha = 6.61376 \cdot \frac{1}{\text{MN}}$$

*Równania MRS*

$$y_0 - 2y_1 + y_2 = \alpha M_1$$

$$y_1 - 2y_2 + y_3 = \alpha M_2$$

$$y_2 - 2y_3 + y_4 = \alpha M_3$$

$$y = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0.83 \\ \hline 1 & 0.00 \\ \hline 2 & -10.75 \\ \hline 3 & 0.00 \\ \hline 4 & 43.82 \\ \hline 5 & 0.00 \\ \hline \end{array} \cdot \text{mm}$$