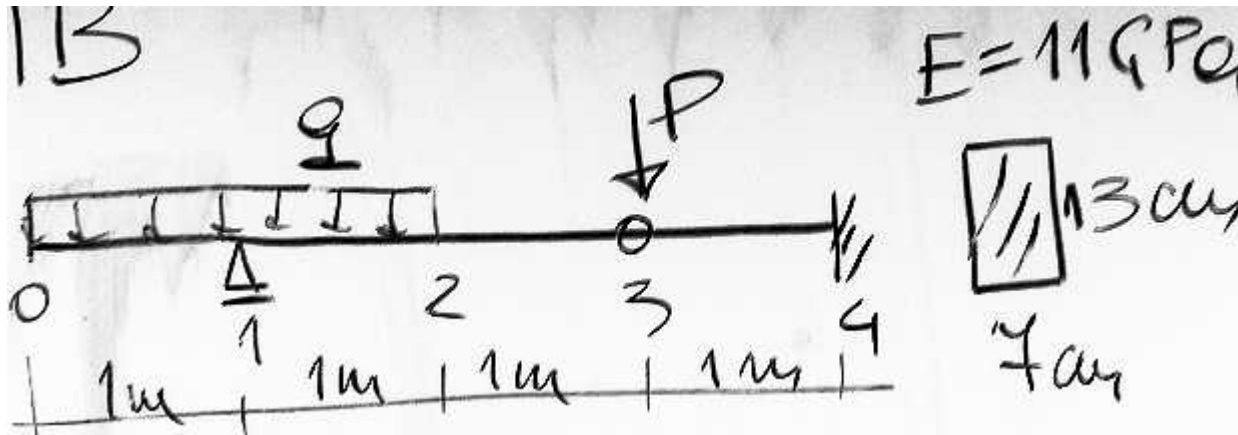


Grupa 1B - Metoda różnic skończonych - ugięcie belki



$$\begin{aligned}
 P &:= 5 \text{ kN} & q &:= 3 \frac{\text{kN}}{\text{m}} & E &:= 11 \text{ GPa} \\
 b &:= 7 \text{ cm} & h &:= 13 \text{ cm} \\
 L &:= 4 \text{ m} & J &:= b \cdot \frac{h^3}{12} = 1281.5833 \cdot \text{cm}^4 \\
 n &:= 4 & \Delta &:= \frac{L}{n} = 1 \text{ m}
 \end{aligned}$$

$$R1 := \frac{q \cdot 2\text{m} \cdot 2\text{m}}{2\text{m}} \quad M1(x) := -q \cdot \frac{x^2}{2}$$

$$M2(x) := M1(x) + R1 \cdot (x - 1\text{m})$$

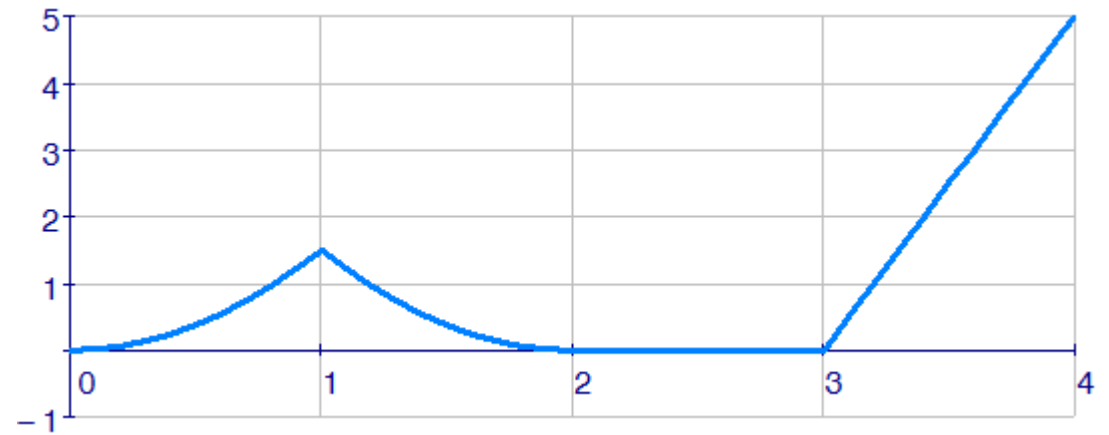
$$M3(x) := M2(x) + q \cdot \frac{(x - 2\text{m})^2}{2}$$

$$M4(x) := M3(x) - P \cdot (x - 3\text{m})$$

$$\alpha := \frac{\Delta^2}{E \cdot J} = 7.0935 \cdot \frac{1}{\text{MN}}$$

dokładność $y \pm 0.0005 \text{ mm}$

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



Warunki brzegowe

$$y_1 = 0 \quad y_4 = 0 \quad \varphi_4 = 0 \quad \text{-----} > \quad 2y_3 = \alpha M_4$$

$$\alpha = 7.0935 \cdot \frac{1}{\text{MN}}$$

Równania MRS

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

$$y_1 - 2y_2 + 3 = \alpha M_2$$

$$2y_3 = \alpha M_4$$

$$y = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & -1.773 \\ \hline 1 & 0.000 \\ \hline 2 & -8.867 \\ \hline 3 & -17.734 \\ \hline 4 & 0.000 \\ \hline \end{array} \cdot \text{mm}$$

