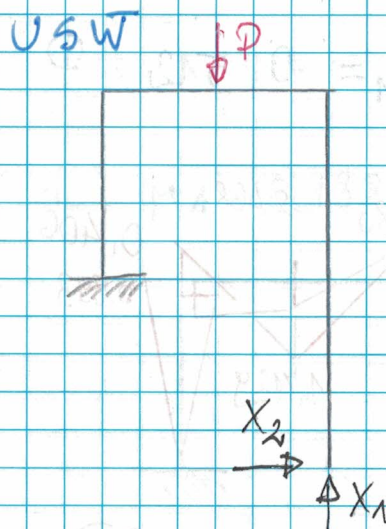
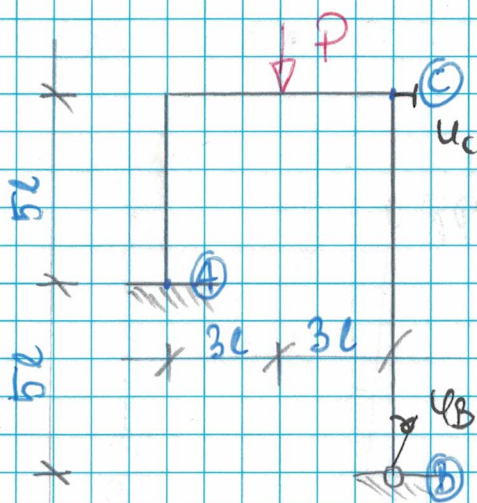


$EY = \text{const.}$ $EA \rightarrow \infty$

1. $M_A = ?$
2. $u_c = ?$
3. $\varphi_B = ?$



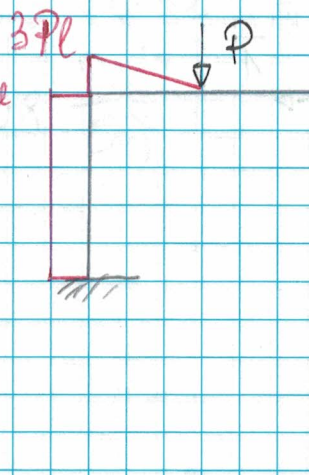
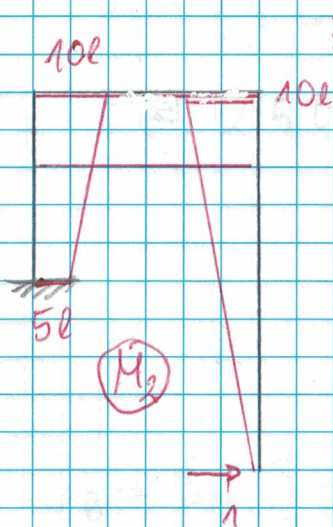
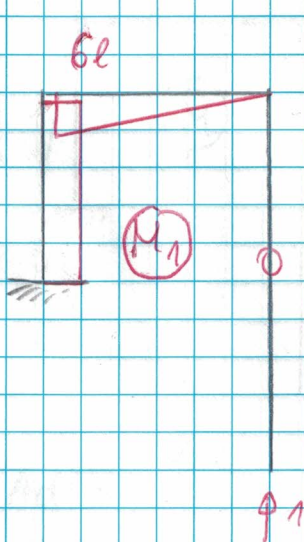
r-nia zgodności

$$\begin{cases} \delta_{11} X_1 + \delta_{12} X_2 + \delta_{10} = 0 \\ \delta_{21} X_1 + \delta_{22} X_2 + \delta_{20} = 0 \end{cases}$$

Stan $X_1 = 1$

Stan $X_2 = 1$

Stan $X_0 = 1$



$$\delta_{11} = \frac{1}{EY} \left[\frac{1}{2} 6l \cdot 6l \cdot \frac{2}{3} 6l + 6l \cdot 5l \cdot 6l \right] = 252 \frac{l^3}{EY}$$

$$\delta_{12} = \frac{1}{EY} \left[\frac{1}{2} 6l \cdot 6l \cdot 10l + 6l \cdot 5l \cdot \frac{1}{2} (10l + 5l) \right] = 405 \frac{l^3}{EY}$$

$$\delta_{22} = \frac{1}{EY} \left[\frac{1}{2} 10l \cdot 10l \cdot \frac{2}{3} 10l + 10l \cdot 6l \cdot 10l + \frac{1}{2} 10l \cdot 5l \cdot \left(\frac{2}{3} 10l + \frac{1}{3} 5l \right) + \frac{1}{2} 5l \cdot 5l \cdot \left(\frac{2}{3} 5l + \frac{1}{3} 10l \right) \right] = 1225 \frac{l^3}{EY}$$

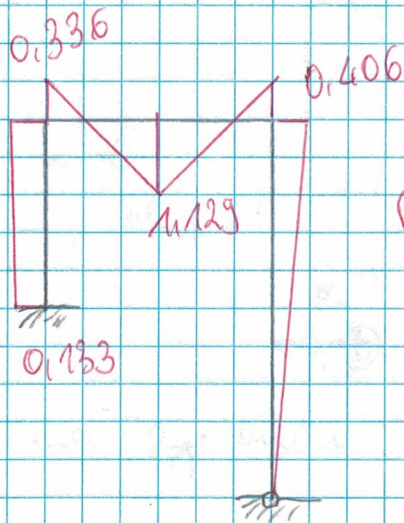
$$\delta_{10} = \frac{1}{EY} \left[-\frac{1}{2} 3Pl \cdot 3l \cdot \left(\frac{2}{3} 6l + \frac{1}{3} 8l \right) - 3Pl \cdot 5l \cdot 6l \right] = -7125 \frac{Pl^3}{EY}$$

$$S_{20} = \frac{1}{EI} \left[\frac{1}{2} 3Pl \cdot 3l (-10l) + 3Pl \cdot 5l \left(-\frac{1}{2} 10l - \frac{1}{2} 5l \right) \right] =$$

$$= -157.5 \frac{Pl^3}{EI}$$

$$X_1 = 0,512 P$$

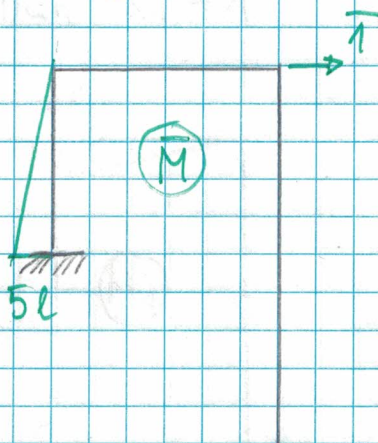
$$X_2 = -0,041 Pl$$



Ad 1 $M_A = 0,133 Pl$

(M) [Pl]

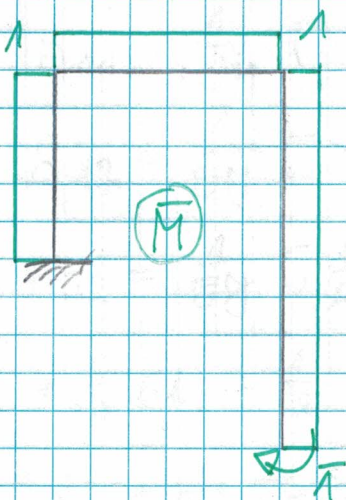
Ad 2



$$u = \frac{1}{EI} \left[\frac{1}{2} 5l \cdot 5l \cdot \left(\frac{2}{3} 0,133 Pl + \frac{1}{3} 0,336 Pl \right) \right]$$

$$= 2,508 \frac{Pl^3}{EI}$$

Ad 3



$$\varphi_B = \frac{1}{EI} \left[\frac{1}{2} 0,406 Pl \cdot 10l \cdot 1 + \right.$$

$$+ \frac{1}{2} (0,406 - 1,129) Pl \cdot 3l \cdot 1 +$$

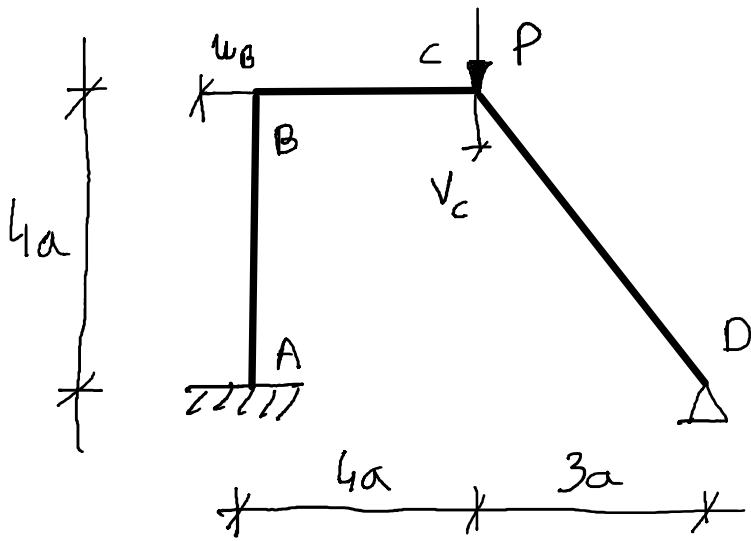
$$+ \frac{1}{2} (0,336 - 1,129) Pl \cdot 3l \cdot 1 +$$

$$+ \frac{1}{2} (0,336 + 0,133) Pl \cdot 5l \cdot 1 \left. \right] =$$

$$= 0,929 \frac{Pl^2}{EI}$$

K1.3

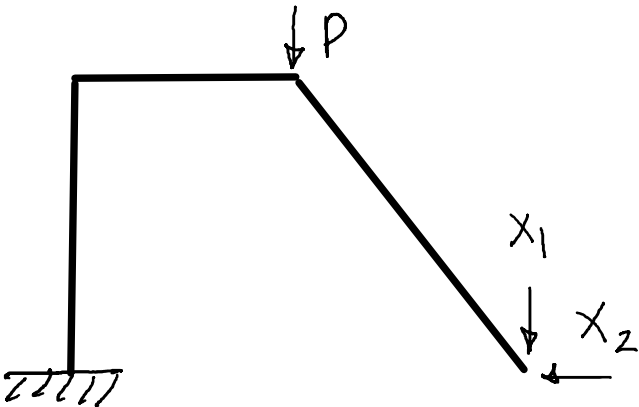
9 I 2025



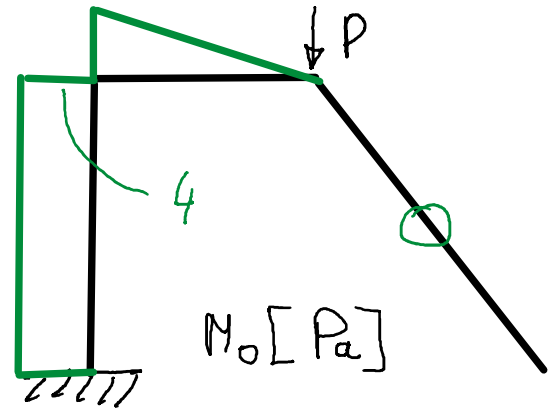
$$\begin{cases} EJ = \text{const.} \\ EA = \infty \end{cases}$$

- 1) $M = ?$
- 2) $w_B = ?$
- 3) $v_c = ?$

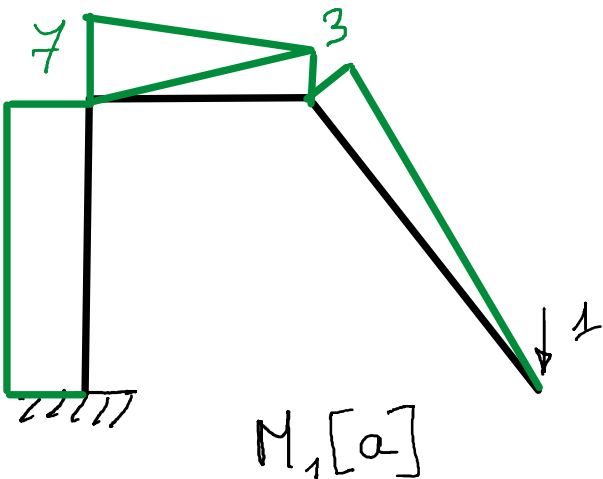
USW



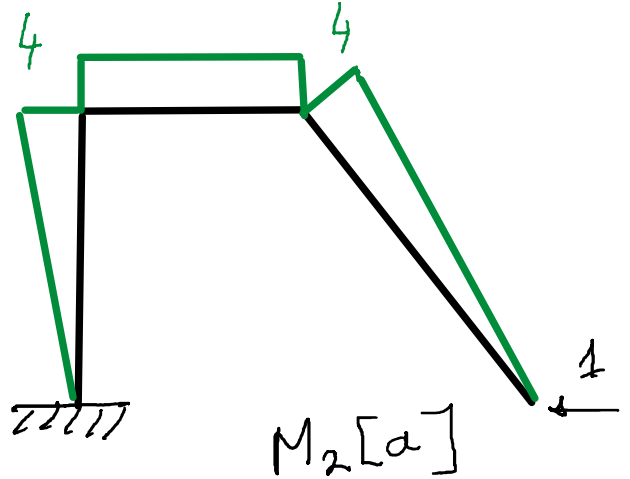
STAN "0"



STAN "1"



STAN "2"



$$\delta_{10} = \frac{1}{EJ} \left(4a \cdot 4Pa \cdot 7a + \frac{1}{2} \cdot 4Pa \cdot 4a \cdot \left(\frac{2}{3} \cdot 7a + \frac{1}{3} \cdot 3a \right) \right) // N // FullSimplify$$

$$\frac{157.333 a^3 P}{EJ}$$

$$\delta_{20} = \frac{1}{EJ} \left(\frac{1}{2} \cdot 4Pa \cdot 4a \cdot 4a + \frac{1}{2} \cdot 4a \cdot 4a \cdot 4Pa \right) // N // FullSimplify$$

$$\frac{64. a^3 P}{EJ}$$

$$\delta_{11} = \frac{1}{EJ} \left(\frac{1}{2} \cdot 3a \cdot 5a \cdot \frac{2}{3} \cdot 3a + \frac{1}{2} \cdot 7a \cdot 4a \cdot \left(\frac{2}{3} \cdot 7a + \frac{1}{3} \cdot 3a \right) + \frac{1}{2} \cdot 3a \cdot 4a \cdot \left(\frac{2}{3} \cdot 3a + \frac{1}{3} \cdot 7a \right) + 7a \cdot 4a \cdot 7a \right) // N // FullSimplify$$

$$\frac{316.333 a^3}{EJ}$$

$$\delta_{12} = \frac{1}{EJ} \left(\frac{1}{2} \cdot 4a \cdot 5a \cdot \frac{2}{3} \cdot 3a + 4a \cdot 4a \cdot \left(\frac{1}{2} \cdot 7a + \frac{1}{2} \cdot 3a \right) + 7a \cdot 4a \cdot \frac{1}{2} \cdot 4a \right) // N // FullSimplify$$

$$\frac{156. a^3}{EJ}$$

$$\delta_{22} = \frac{1}{EJ} \left(\frac{1}{2} \cdot 4a \cdot 5a \cdot \frac{2}{3} \cdot 4a + 4a \cdot 4a \cdot 4a + \frac{1}{2} \cdot 4a \cdot 4a \cdot \frac{2}{3} \cdot 4a \right) // N // FullSimplify$$

$$\frac{112. a^3}{EJ}$$

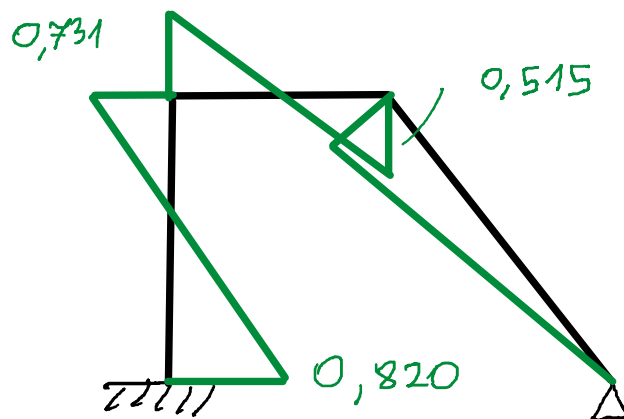
$$\delta_{21} = \delta_{12}$$

$$\frac{156. a^3}{EJ}$$

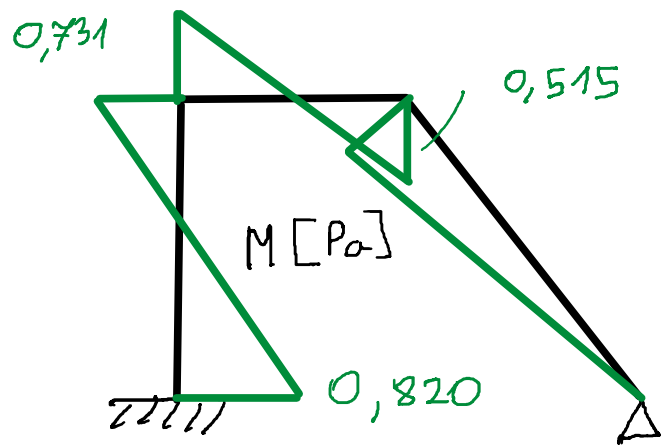
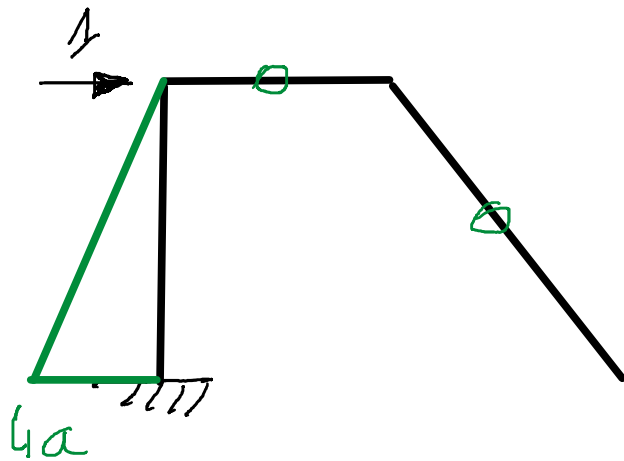
$$\text{Solve}[\delta_{11} X_1 + \delta_{12} X_2 + \delta_{10} == 0 \ \&\& \ \delta_{21} X_1 + \delta_{22} X_2 + \delta_{20} == 0, \{X_1, X_2\}]$$

$$\{\{X_1 \rightarrow -0.688462 P, X_2 \rightarrow 0.3875 P\}\}$$

1) $M [Pa]$



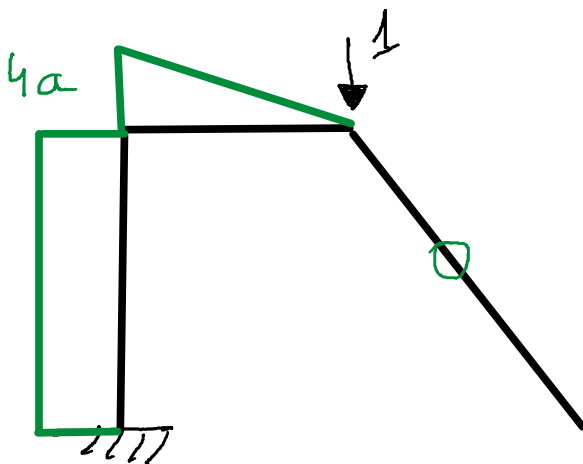
2) u_B



$$u_B = \frac{1}{EJ} \left(\frac{1}{2} * 4a * 4a * \left(-\frac{2}{3} * 0.820 Pa + \frac{1}{3} * 0.731 Pa \right) \right) // N // FullSimplify$$

$$= \frac{2.424 a^3 P}{EJ}$$

3) v_C



$$v_C = \frac{1}{EJ} \left(4a * 4a * \left(\frac{1}{2} * 0.731 - \frac{1}{2} * 0.820 \right) + \frac{1}{2} * 4a * 4a * \left(\frac{2}{3} * 0.731 - \frac{1}{3} * 0.515 \right) \right) // N //$$

FullSimplify

$$= \frac{1.81333 a^2}{EJ}$$