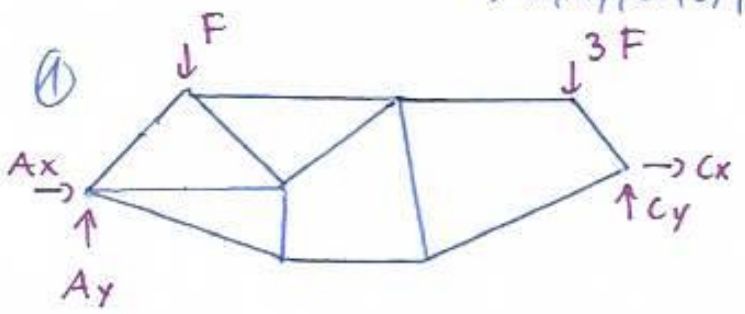
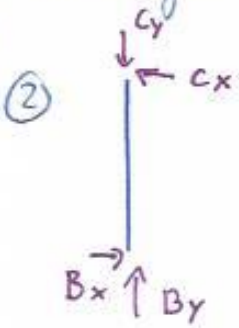
Mechanik 1 Klausur 2 HS 13

Lösungen ohne Gewähr

1) a) statisch bestimmt : 6 Unbekannte, 3×2 Gleichungen
↳ $A_x, A_y, C_x, C_y, B_x, B_y$

b)





② $R_x = 0$: $B_x = C_x$

$R_y = 0$: $B_y = C_y$

$\Sigma M_B = 0$: $C_x L = 0$ $\quad [C_x = B_x = 0]$

① $R_x = 0$: $A_x + C_x = 0$ $\quad [A_x = 0]$

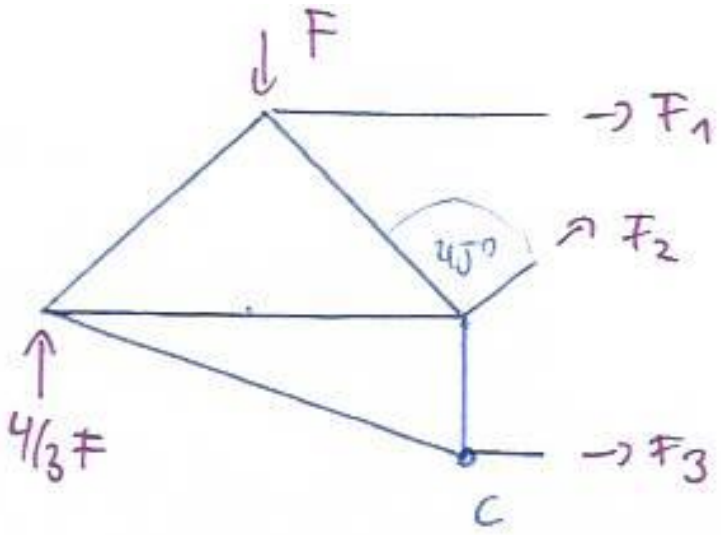
$R_y = 0$: $A_y + C_y = 4F$

$\Sigma M_A = 0$: $-FL - 15FL + C_y 6L = 0$

$$\left[C_y = \frac{8}{3}F\right]$$

$$\Rightarrow \left[A_y = 4F - \frac{8}{3}F = \frac{4}{3}F\right]$$

$$\left[B_y = C_y = \frac{8}{3}F\right]$$



$$R_x = 0: \quad F_1 + \frac{\sqrt{2}}{2} F_2 + F_3 = 0$$

$$R_y = 0: \quad \frac{4}{3}F - F + F_2 \frac{\sqrt{2}}{2} = 0 \qquad \left[F_2 = -\frac{\sqrt{2}}{3}F\right]$$

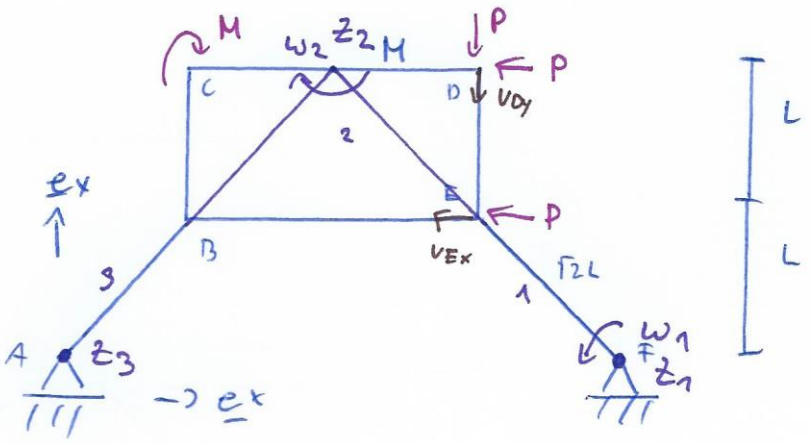
$$\Sigma M_C = 0: \quad -F_2 \frac{\sqrt{2}}{2} L - F_1 2L + FL - \frac{4}{3}F \cdot 2L = 0$$

$$\frac{\sqrt{2}}{2}\frac{\sqrt{2}}{3}F - 2F_1 + F - \frac{8}{3}F = 0$$

$$\left[F_1 = -\frac{2}{3}F\right]$$

$$\left[F_3 = -F_1 - \frac{\sqrt{2}}{2}F_2 = \frac{2}{3}F + \frac{\sqrt{2}}{2}\frac{\sqrt{2}}{3}F = F\right]$$

2) $P = 0 = \sum_i F_i v_i$



$v_{Ex} = \omega_1 L$

$\omega_2 = \omega_1 \rightarrow |ME| = |EF|$

$v_{Dx} = 0$

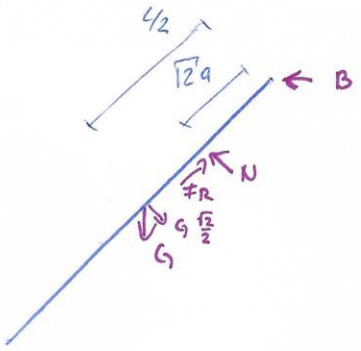
$v_{Dy} = \omega_1 L$

$P = 0 = P\omega_1 L + P\omega_1 L + M\omega_1 = 0$

$M = -2PL$

$\left[\frac{M}{P} = -2L\right]$

3)



$R_x = 0: \quad -B + \frac{\sqrt{2}}{2} F_R - \frac{\sqrt{2}}{2} N = 0$

$R_y = 0: \quad -G + \frac{\sqrt{2}}{2} F_R + \frac{\sqrt{2}}{2} N = 0$

$\Sigma M_B = 0: \quad -N a \sqrt{2} + G \frac{L}{2} \frac{\sqrt{2}}{2} = 0$

$$\left[N = \frac{GL}{4a} \right]$$

$$\left[F_R = \sqrt{2} G - N = G\left(\sqrt{2} - \frac{L}{4a}\right) \right]$$

$|F_R| \leq \mu_0 |N|$

$G\left(\sqrt{2} - \frac{L}{4a}\right) \leq 2 \frac{GL}{4a}$

$4\sqrt{2} a - L \leq 2L$

$a \leq \frac{3L}{4\sqrt{2}} \quad \Leftrightarrow \quad \frac{4\sqrt{2} a}{3} \leq L$

$a \leq \frac{3\sqrt{2} L}{8}$

zusätzlich $B \geq 0$

$B = \frac{\sqrt{2}}{2}(F_R - N) = G - \frac{\sqrt{2} GL}{4a}$

$0 \leq G - \frac{\sqrt{2} GL}{4a} \Leftrightarrow \left[L \geq 2\sqrt{2} a \right]$

↳ schwächere Bedingung

b) $L = 2\sqrt{2} a$

$\frac{4\sqrt{2} a}{3} \leq 2\sqrt{2} a$

$\left[\frac{4}{3} \leq 2 \right]$ ✓✓ → Ruhe!