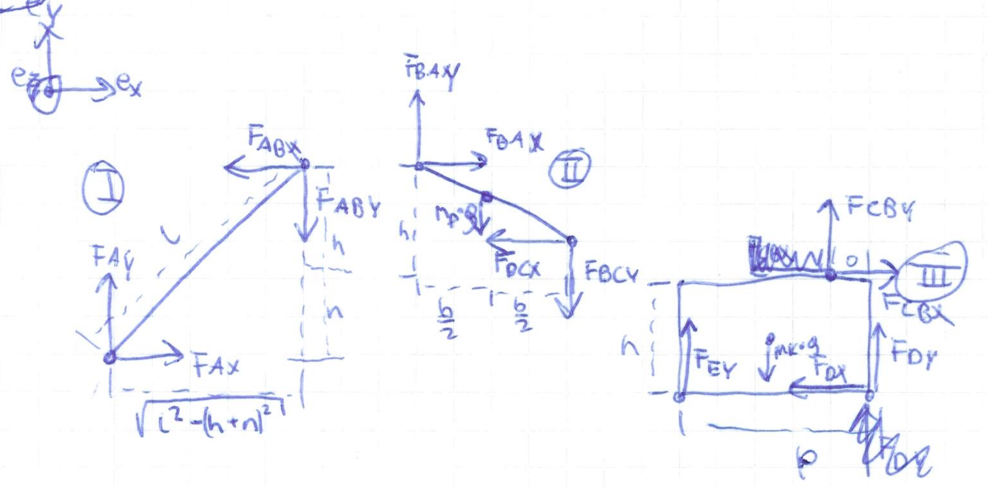
Aufgabe 3)



I:

$$F_{Ay} - F_{ABy} = \emptyset$$
$$F_{Ax} - F_{ABx} = \emptyset$$

$$\cancel{\text{III}_A}\quad F_{ABx}\cdot(h+n)\ \cancel{-}\ F_{ABy}\cdot\sqrt{l^2-(h+n)^2} = \emptyset$$
$$\cancel{F}_{Ax}\cdot(h+n)\ \cancel{-}\ F_{A\cancel{y}}\cdot\sqrt{l^2-(h+n)^2} = \emptyset$$

II

$$F_{BAx} - F_{BCx} = \emptyset$$
$$F_{BAy} - F_{BCy} - m_p\cdot g = \emptyset$$

$$\cancel{F_{ABx}\cdot(h+n) + F_{ABy}}$$

$$-m_p\cdot g\cdot\frac{b}{2} - F_{BCx}\cdot h - F_{BCy}\cdot b = \emptyset$$

$$m_p\cdot g\cdot\frac{b}{2} - F_{BAx}\cdot h - F_{BAy}\cdot b = \emptyset$$

III

$$F_{CBx} - F_{Dx} = \emptyset$$
$$F_{Ey} + F_{Dy} + F_{CBy} - m_k\cdot g = \emptyset$$

$$F_{CBy}(p-o) + F_{Dy}\cdot p - F_{CBx}\cdot n + F_{Dx}\cdot\emptyset - m_k\cdot g\cdot\frac{p}{2} = \emptyset$$

$$-F_{Ey}\cdot p - F_{CBx}\cdot n - F_{CBy}\cdot o + m_k\cdot g\cdot\frac{p}{2} = \emptyset$$

$$F_{Dy}\cdot o - F_{Dx}\cdot n + m_k\cdot g\left(\frac{p}{2} - o\right) - F_{Ey}\cdot(p-o) = \emptyset$$

$\beta = 11^\circ$

$\alpha = \arccos(2 \cdot \sin(11)) = 67{,}57^\circ$

$m = 20\,kg$

$g = 9{,}81 \frac{m}{s^2}$

2)

$e_x: \quad 2 \cdot f_s \cdot \sin(\beta) - f_s \cdot \cos(\alpha) = 0$

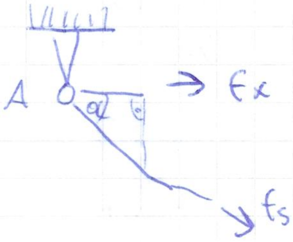
$e_y: \quad -m \cdot g + 2 \cdot f_s \cdot \cos(\beta) + f_s \cdot \sin(\alpha) = 0$

$m \cdot g = f_s \, (2 \cdot \cos(\beta) + \sin(\alpha))$

$$f_s = \frac{20 \cdot 9{,}81}{2 \cdot \cos(11) + \sin(\arccos(2 \cdot \sin(11)))}$$

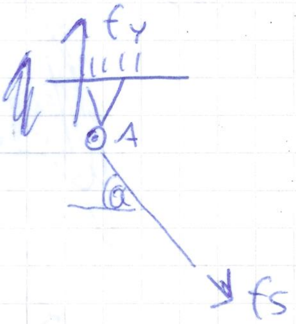
$$f_s = \frac{m \cdot g}{2 \cdot \cos(\beta) + \sin(\alpha)} = \cancel{68{,}36} = 67{,}95\,N$$

3)



$f_x = \cos(\alpha) \cdot f_s = 25{,}93\,N$

4)



$f_y = -\sin(\alpha) \cdot f_s = -62{,}81\,N$

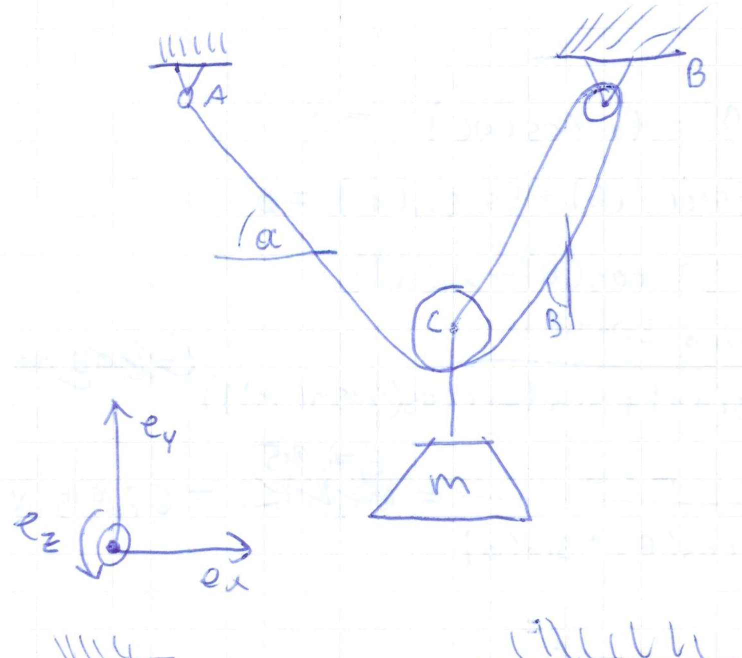
4)

Max $F = 74{,}2463\,N$

$f_s < F_{max} \Rightarrow$ Lagen hält stand

Modellbildung

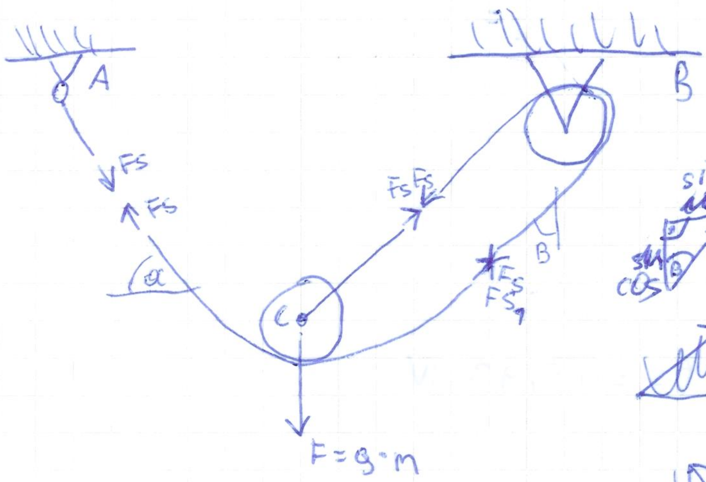
Aufgabe 1

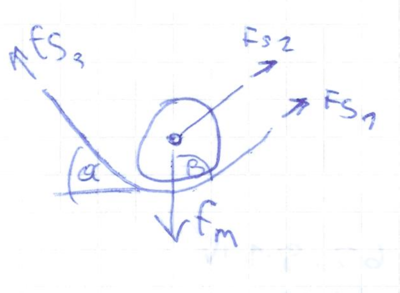


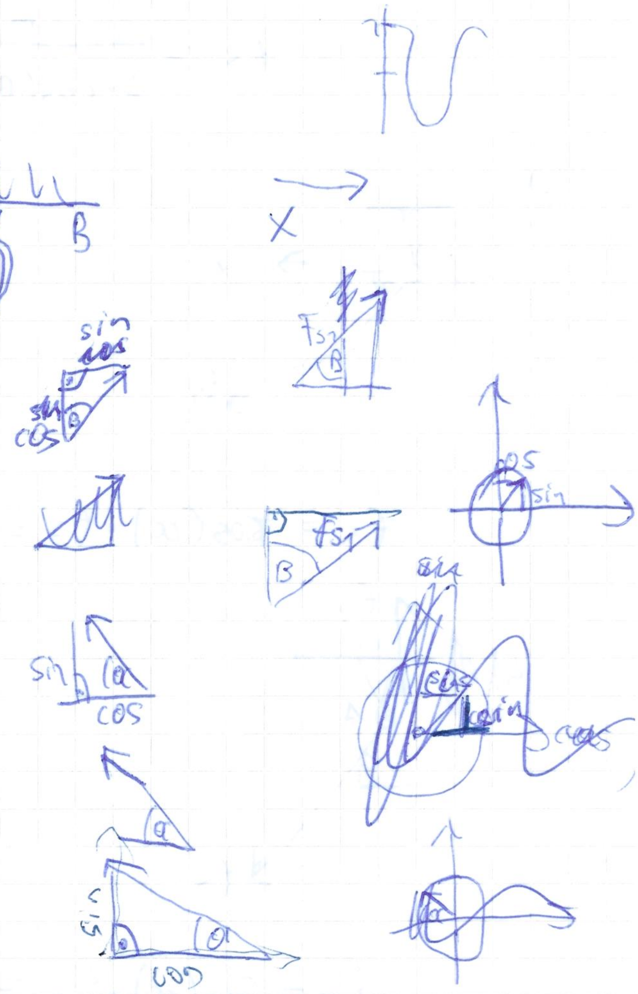
$\beta = 11^{\circ}$

$m = 20\,kg$

$g = 9{,}81\,\frac{m}{s^2}$







1) ~~$+ f_{s1} \cdot \cos(B) + f_{s2} \cdot \sin(B) - f_{s3} \cdot \sin(\alpha)$~~

$e_x:\ 0 = f_{s1} \cdot \sin(B) + f_{s2} \cdot \sin(B) - f_{s3} \cdot \cos(\alpha)$

$e_y:\ -f_m + F_{s1} \cdot \cos(B) + f_{s2} \cdot \cos(B) + \sin(\alpha) f_{s3}$

$f_{s1} = f_{s2} = f_{s3}:$ $2 \cdot f_s \cdot \sin(B) - f_s \cdot \cos(\alpha) = 0$

$2 \cdot \cancel{f_s} \cdot \sin(B) = \cos(\alpha) \cdot \cancel{f_s}$ $\arccos(x) = \alpha$

$\alpha = \arccos(2 \cdot \sin(11))$ $2 \cdot \sin(B = \cos(\alpha) \Rightarrow x = \cos(\alpha)$