1.

i	E_{kin} (meV)	E_{kin}^2 (meV^2)
1	56.2	3158.44
2	58.9	3469.21
3	63.0	3969
4	60.5	3660.25
5	58.6	3433.96
6	53.7	2883.69
7	54.2	2937.64
8	61.7	3806.89
9	57.7	3329.29
10	56.0	3136
Σ	580.5	33784.37

$$\bar{E}_{kin} = \frac{\sum_1 E_{kin}}{n} = 58.05 \text{ meV} \quad \checkmark 2$$

$$m = \sqrt{\frac{\Sigma (x_i - \bar{x})^2}{n-1}} = 3.087400 \text{ meV} \quad \checkmark 2$$

$$M = \frac{m}{\sqrt{n}} = 0.976484 \text{ meV} \quad \checkmark$$

$$R = \frac{M}{\bar{E}_{kin}} = 0.016823 \approx 1.7\% \quad \checkmark 1$$

$$E_{kin} = (58.1 \pm 1.0) \text{ meV} \quad \checkmark 5$$

(10)

2.

$$\frac{I_0}{U_0} = (0.34 \pm 0.03)\,\Omega^{-1}$$

$$R = (1.0 \pm 0.1)\,\Omega$$

$$L = 0.072\ H$$

(20)

$$I_0 = \frac{U_0}{\sqrt{R^2 + (\omega L)^2}}$$

$$\frac{I_0}{U_0} = \frac{1}{\sqrt{R^2 + (\omega L)^2}}$$

$$\frac{I_0}{U_0} \equiv a$$

$$\frac{I_0}{U_0}\sqrt{R^2 + (\omega L)^2} = 1$$

$$(\omega L)^2 = \frac{1}{\left(\frac{I_0}{U_0}\right)^2} - R^2$$

$$\omega = \frac{\sqrt{\frac{1}{a^2} - R^2}}{L}$$

$$\bar{\omega} = \frac{\sqrt{\frac{1}{\bar{a}^2} - \bar{R}^2}}{L} = 38.416072\ s^{-1}$$

$$M_\omega^2 = \left(\frac{\partial \omega}{\partial a}\Big|_{\bar{a},\bar{R}} \cdot M_a\right)^2 + \left(\frac{\partial \omega}{\partial R}\Big|_{\bar{a},\bar{R}} \cdot M_R\right)^2 =$$

$$= \left(\frac{1}{L}\frac{1}{2\sqrt{\frac{1}{\bar{a}^2} - \bar{R}^2}} \cdot \frac{-2}{\bar{a}^3} \cdot M_a\right)^2 + \left(\frac{1}{L}\frac{1}{2\sqrt{\frac{1}{\bar{a}^2} - \bar{R}^2}} \cdot (-2\bar{R}) \cdot M_R\right)^2 =$$

$$= 14.941848\ s^{-2}$$

$$M_\omega = 3.865469\ s^{-1}$$

$$R = \frac{M_\omega}{\bar{\omega}} = 0.100621 \approx 10\%$$

$$\omega = (38 \pm 4)\ s^{-1}$$

3.

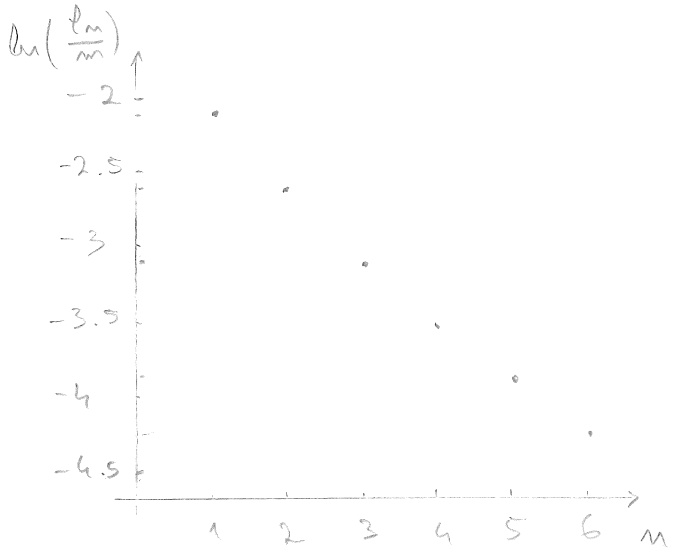
i	m	$l_m\ (10^{-2}\,m)$	$y = \ln\left(\frac{l_m}{m}\right)$	$x \equiv m$
1	1	12.2	−2.103734	1
2	2	7.2	−2.631089	2
3	3	4.2	−3.170086	3
4	4	3.0	−3.506558	4
5	5	2.1	−3.863233	5
6	6	1.4	−4.268698	6
Σ				

10 + 20

$$\ln\left(\frac{l_m}{l_0}\right) = -m\Lambda$$

$$\ln l_m = -\Lambda m + \ln l_0 \quad \surd 3$$

($\ln l_m$ → y_0; $-\Lambda$ → a; m → x; $\ln l_0$ → b)



$\Sigma x = 21$

$\Sigma x^2 = 91$

$\Sigma y = -18.543388$

$\Sigma y^2 = 66.840072$

$\Sigma xy = -75.830755$

$$\bar{a} = \frac{\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2} = -0.424506 \quad \surd 3$$

$$M_a = \sqrt{\frac{1}{n-2}\left(\frac{n\Sigma y^2 - (\Sigma y)^2}{n\Sigma x^2 - (\Sigma x)^2} - a^2\right)} = 0.020379 \quad \surd 3$$

$$\bar{b} = \frac{\sum x^2 \sum y - \sum x \sum xy}{n \sum x^2 - (\sum x)^2} = -1.771461 \checkmark$$

$$M_b = M_0 \sqrt{\frac{1}{n} \sum x_i^2} = 0.079366 \checkmark$$

$$a = -(0.42 \pm 0.02) \checkmark$$

$$\underline{b = -(1.77 \pm 0.08)}$$

$$R_a = \frac{M_a}{\bar{a}} = 0.048006 \approx 4.8\% \checkmark$$

$$R_b = \frac{M_b}{\bar{b}} = 0.044803 \approx 4.5\%$$

$$a = -\Lambda$$

$$\Lambda = -a$$

$$\bar{\Lambda} = -\bar{a} = 0.424506$$

$$M_\Lambda^2 = \left(\frac{\partial \Lambda}{\partial a}\Big|_{\bar{a}} \cdot M_a \right)^2 = (-1 \cdot M_a)^2$$

$$M_\Lambda = 0.020379$$

$$b = \ln f_0$$

$$f_0 = e^b$$

$$\bar{f}_0 = e^{\bar{b}} = 0.170084 \text{ m} \checkmark$$

$$M_{f_0}^2 = \left(\frac{\partial f_0}{\partial b}\Big|_{\bar{b}} \cdot M_b \right)^2 = \left(e^{\bar{b}} \cdot M_b \right)^2$$

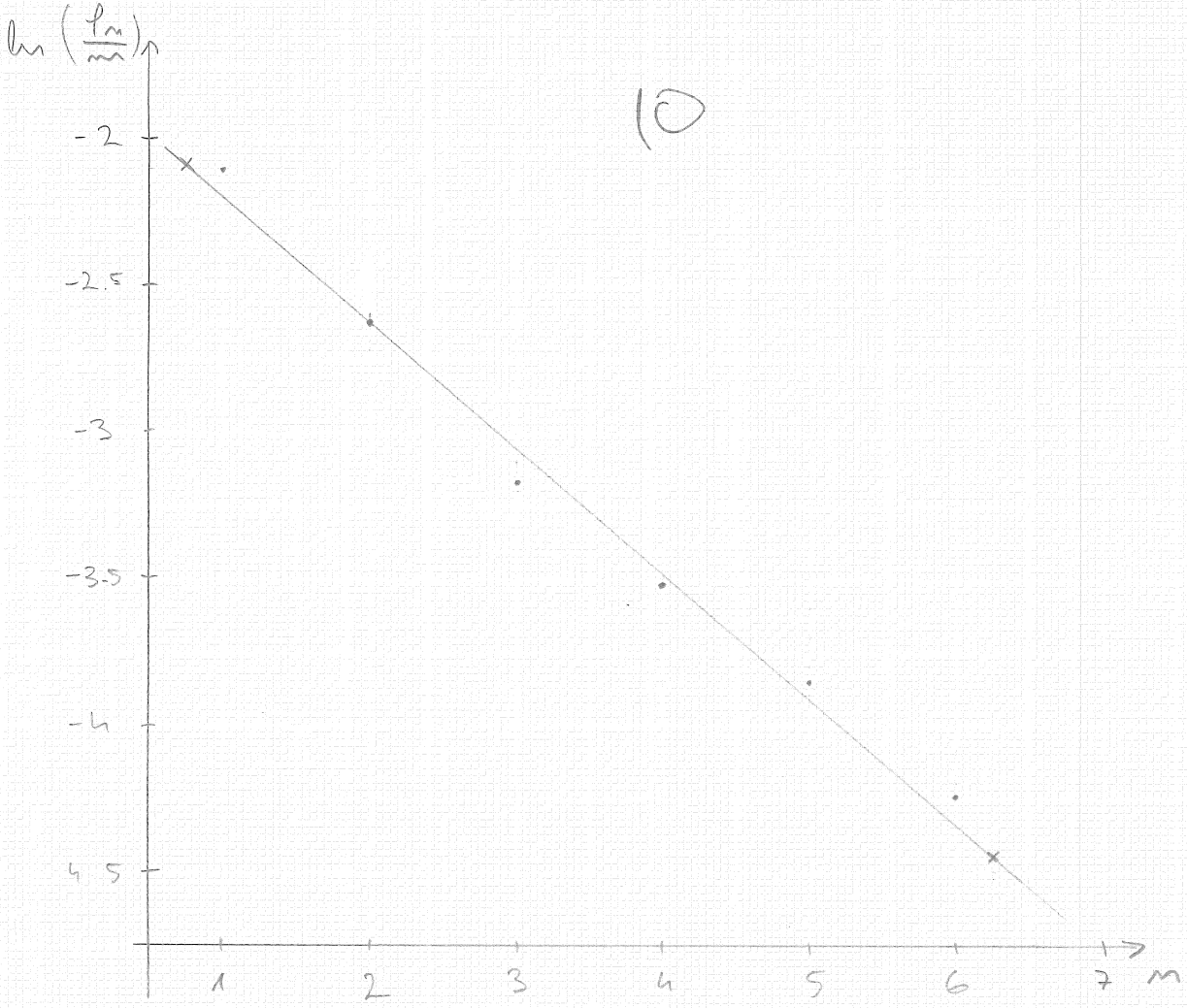
$$M_{f_0} = 0.013499 \text{ m} \checkmark$$

$$\Lambda = (0.42 \pm 0.02) \checkmark$$

$$\underline{f_0 = (0.17 \pm 0.01) \text{ m}}$$

$$R_\Lambda = \frac{M_\Lambda}{\bar{\Lambda}} = 0.048006 \approx 4.8\%$$

$$R_{f_0} = \frac{M_{f_0}}{\bar{f}_0} = 0.079367 \approx 7.9\%$$



10

[0.75, -2.089841]

[6.25, -4.424624]