3) a) $W_{e\,zač} = \frac{e^2}{4\pi\varepsilon_0(2a)}$

$W_{e\,kon} = \frac{e^2}{4\pi\varepsilon_0(2a)} + \frac{2e^2}{4\pi\varepsilon_0 a}$ } 5

$A = \Delta W = 2\frac{e^2}{4\pi\varepsilon_0 a} \overset{③}{=} \frac{2\,(10^{-5}\,As)^2}{4\pi\cdot 8{,}87\cdot 10^{-12}\left(\frac{A^2s^2}{Nm^2}\right)1m}$

$= 1{,}79\,J$ ②

b) Stranski kroglici odnese stran.

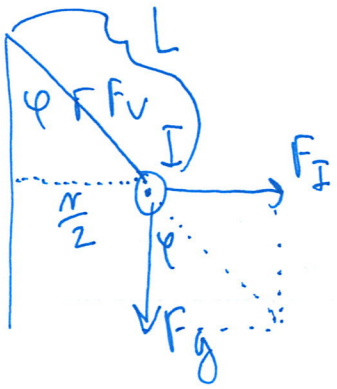
$W_{zač} = W_{kon}$ gledamo cel sistem 3 kroglic!

$\underbrace{\frac{e^2}{4\pi\varepsilon_0(2a)} + \frac{2e^2}{4\pi\varepsilon_0 a} = \frac{e^2}{4\pi\varepsilon_0(2a+2m)} + \frac{2e^2}{4\pi\varepsilon_0(a+1m)}}_{3} + \underbrace{2\frac{mv^2}{2}}_{2}$

$mv^2 = \frac{e^2}{4\pi\varepsilon_0 a}\left(\frac{1}{2} + 2 - \frac{1}{4} - \frac{2}{2}\right) = \frac{e^2}{4\pi\varepsilon_0 a}\frac{5}{4}$

$v = \sqrt{\frac{5}{16}\frac{e^2}{\pi\varepsilon_0 a m}} = 10{,}5898\,\frac{m}{s}$ ⑤ 2

4)



$$\tan\varphi = \frac{F_I}{F_g}$$

$$\sin\varphi = \frac{r/2}{L} \qquad r = 2L\sin\varphi$$ } 5

$$F_I = \frac{\mu_0 I^2}{2\pi r}\, l$$

$$F_g = \lambda l g$$ } 5

$$\tan\varphi = \frac{\mu_0 I^2}{2\pi \lambda g 2L \sin\varphi}$$

$$\tan\varphi \sin\varphi = \frac{\mu_0 I^2}{2\pi \lambda g 2L}$$ (5)

$$b = 0{,}0266$$

$$\frac{\sin^2\varphi}{\cos\varphi} = b$$

$$\frac{1-\cos^2\varphi}{\cos\varphi} = b$$

$$1-\cos^2\varphi = b\cos\varphi$$

$$\cos^2\varphi + b\cos\varphi - 1 = 0$$ (5)

$$\cos\varphi_{1,2} = \frac{b \pm \sqrt{b^2 - 4(-1)}}{1}$$

$$= \begin{cases} 1{,}073 & \text{ne obstaja} \\ 0{,}9867 \end{cases}$$

$$\varphi = 9{,}34^\circ$$ (5)