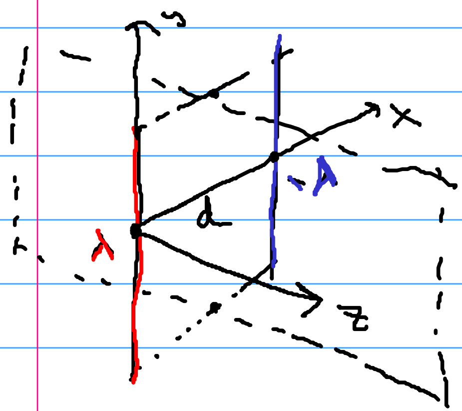
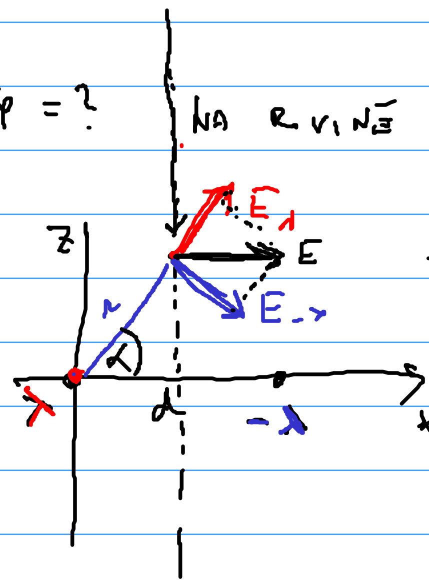
1.1.22



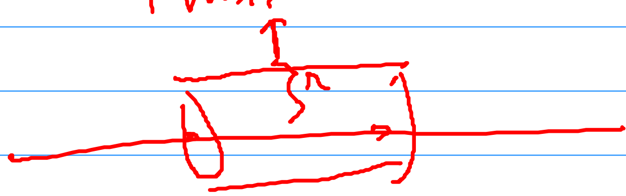
$\vec{E} = ?$ $\varphi = ?$

NA ROVINĚ SYMETRIE



$$E = 2 \cdot \cos\alpha \cdot E_\lambda = 2 \cdot \frac{\frac{d}{2}}{r} \cdot E_\lambda = \frac{E_\lambda d}{r}$$

1 VODIČ



$$\oint \vec{E} \cdot d\vec{S} = \frac{Q_{in}}{\varepsilon_0}$$

$$E \cdot 2\pi r \cdot \cancel{\ell} = \frac{\lambda \cancel{\ell}}{\varepsilon_0}$$

$$E = \frac{\lambda}{2\pi r \varepsilon_0}$$

$$E_{-\lambda} = E_\lambda = \frac{\lambda}{2\pi\varepsilon_0 r}, \quad r = \sqrt{\frac{d^2}{4} + z^2}$$

$$\dots \; E_x = \frac{d \cdot \lambda}{2\pi\varepsilon_0 \left(\frac{d^2}{4} + z^2\right)}$$

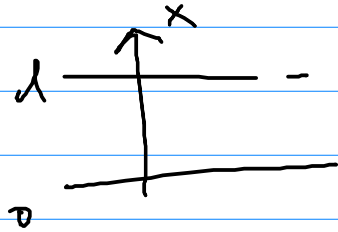
$\varphi = ?$

$$\vec{E} = -\nabla\varphi$$

$$\varphi(\vec{r}) = \int_{\infty}^{\vec{r}} \underbrace{\vec{E} \cdot d\vec{\ell}}_{0} = 0$$

NA ROVINĚ SYM.

1.1.23



$\varphi = k x^n$ $n > 1$

$\rho(x) = ?$ $0 < x < d$

$\sigma(0) = ?$

$\sigma(d) = ?$

$$\Delta\varphi = \frac{\rho}{\varepsilon_0}$$ GAUSS V DIF. TVARU

$$\sigma = \varepsilon_0 E_n$$

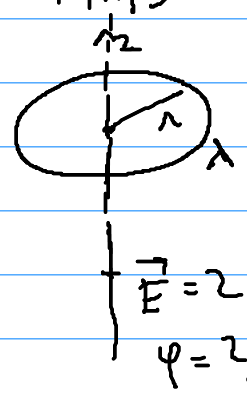
$$\vec{E} = -\nabla\varphi = -\left(\frac{\partial\varphi}{\partial x}, \frac{\partial\varphi}{\partial y}, \frac{\partial\varphi}{\partial z}\right) = \left(-k n x^{n-1}, 0, 0\right)$$

$$\underline{\sigma(0) = 0} \qquad \underline{\sigma(d) = -\varepsilon_0 k n d^{n-1}},$$

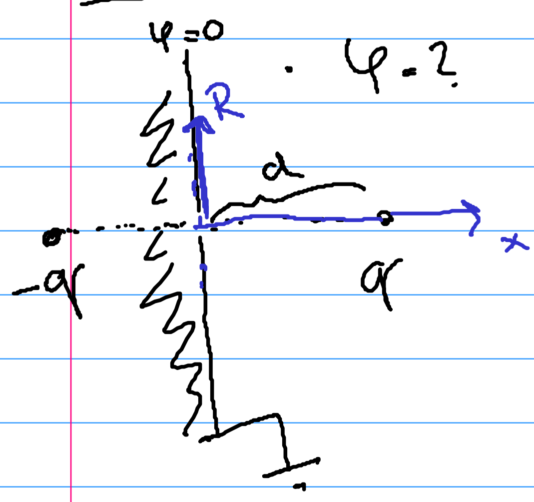
$$\rho = \varepsilon_0 \cdot \Delta\varphi = \varepsilon_0 \nabla\cdot\nabla\varphi = \varepsilon_0 \nabla\cdot\left(k n x^{n-1}, 0, 0\right)$$

$$= \underline{\varepsilon_0 k n \cdot (n-1) \cdot x^{n-2} + 0 + 0}$$

DÚ: 1.1.15 pole na ose nabité kružnice



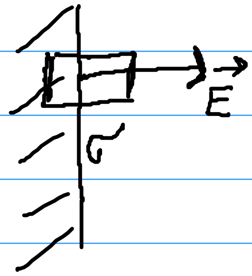
1.1.14



$$\Delta\varphi = \frac{\rho}{\varepsilon_0}$$ + okr. podm.

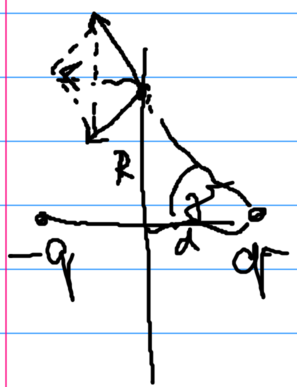
$$\varphi = \varphi_+ + \varphi_- = \frac{q}{4\pi\varepsilon_0}\left(\frac{1}{\sqrt{(x-d)^2 + R^2}} - \frac{1}{\sqrt{(x+d)^2 + R^2}}\right)$$

$\sigma = ?$

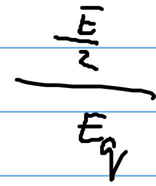


$\oint \vec{E} \cdot d\vec{S} = E_n \cdot dS = \frac{\sigma \cdot dS}{\varepsilon_0}$

$\sigma = \varepsilon_0 E_n$



$E_q = \frac{1}{4\pi\varepsilon_0} \cdot \frac{q}{d^2+R^2}$



$\frac{\frac{E}{2}}{E_q} = \frac{d}{\sqrt{d^2+R^2}}$

$E = 2E_q \cdot \frac{d}{\sqrt{}}$

$= \frac{1}{2\pi\varepsilon_0} \cdot \frac{qd}{(d^2+R^2)^{3/2}}$

$\sigma = \frac{1}{2\pi} \frac{qd}{(d^2+R^2)^{3/2}}$

$Q = \int_0^{2\pi}\int_0^{\infty} \sigma R \, d\varphi \, dR = qd \cdot \int_0^{\infty} \frac{R\,dR}{(d^2+R^2)^{3/2}} =$

$= -qd \left[-t^{-\frac{1}{2}} \right]_{d^2}^{\infty} = \underline{\underline{-q}}$