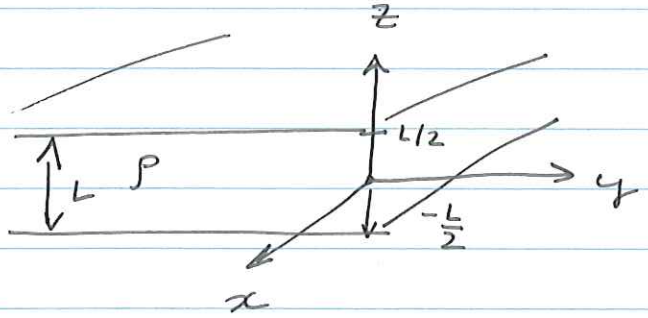
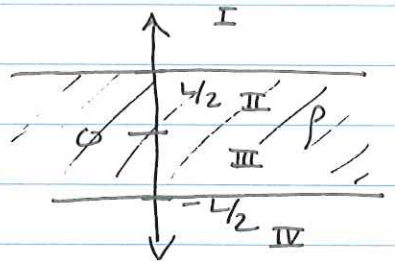
Consider a thick, infinite slab of uniform charge density ρ and thickness L. (infinite in x & y)





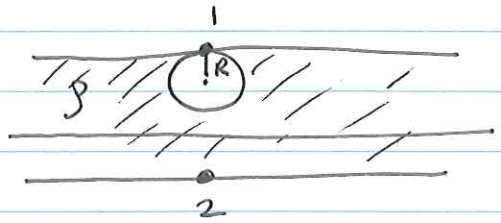
(a) What is $\vec{E}(z)$? four regions $\begin{cases} z > L/2 \\ 0 < z < L/2 \\ -L/2 < z < 0 \\ z < -L/2 \end{cases}$

(b) What is $\phi(z)$? Let $\phi(0) = 0$. (i.e. $\vec{r}_0 = (0,0,0)$)

(c) What is the potential difference $\Delta\phi$ between the center ($z=0$) and surface ($z = \pm L/2$)

(d) Check $\vec{E} = -\vec{\nabla}\phi$

(e) Suppose one side of the slab has a spherical "bubble" of radius R on the surface.



what is the potential difference between points 1 and 2?