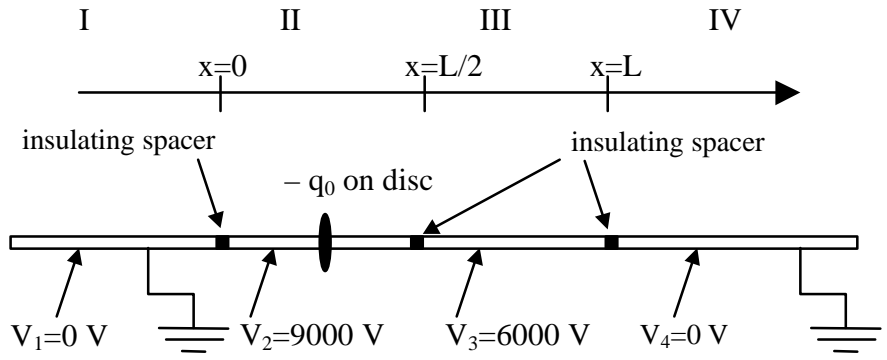
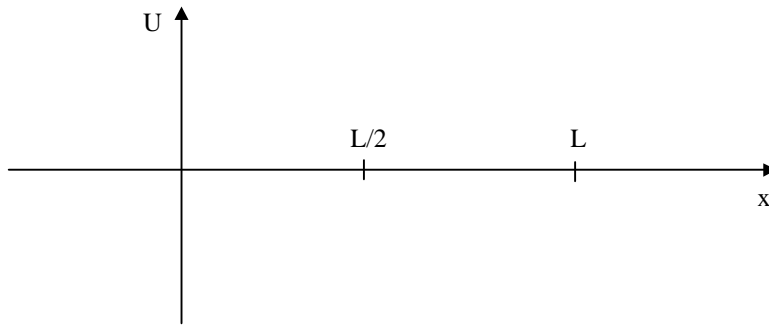


4. Consider a thin, frictionless disc with charge $-q_0$ able to move along a wire on which a potential is located, as shown in the figure to the right. A coordinate system and four regions of space are indicated in the figure.



The value of $q_0 = .001 \text{ C}$.

a. Sketch the potential energy diagram of the disc at all values of x . Explain how you arrived at your answer.



b. i. The *total* energy of the disc is $E = -3 \text{ J}$. Compare the speed of the disc in regions I, II, III and IV. If the speed is zero (or the disc is not located in a region), state so explicitly. Explain how you arrived at your answer.

ii. Find a value for the probability of finding the disc in each region: P_I , P_{II} , P_{III} , and P_{IV} . If the probability is zero, state so explicitly. Compare the probabilities. Explain how you arrived at your answer.

c. Consider that the total energy of the disc is given by $E = +3 \text{ J}$. Compare the kinetic energy of the disc in regions I, II, III, and IV. If it is zero (or the disc is not located in a region), state so explicitly. Explain how you arrived at your answer.