

PHY 322: Electromagnetic Fields - Spring 2004

Midterm 2

April 2, 2004

Important: Each problem carries equal weight. Choose *any two* problems and cross out the remaining one. If you try all three problems, we count the worst two.

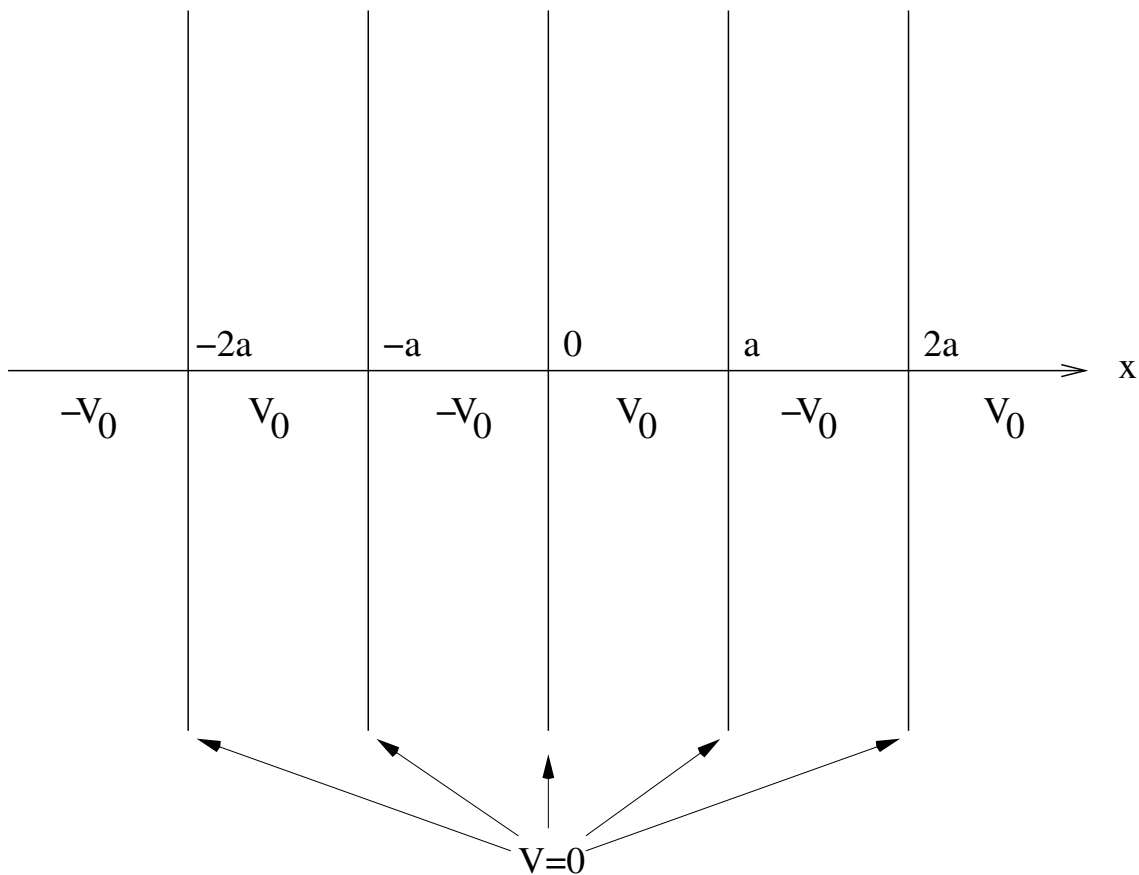
Please print your name here:

For the grader:

Problem 1	
Problem 2	
Problem 3	
Total	

Problem 1

Calculate the potential V everywhere for the configuration below. The planes $x = na$ where $n = 0, \pm 1, \pm 2, \dots$ are held at ground potential $V = 0$, while the planes lying along $y = 0$ alternately have $V = V_0$ and $V = -V_0$.



Problem 2:

A sphere of radius a has a surface distribution of charge of $\cos 2\theta$. Find the potential everywhere *outside* the sphere.

Problem 3:

Consider two infinitely long concentric *cylindrical* surfaces of radius a and b respectively ($a < b$), whose axes coincide with the z-axis. The potential on the inner cylinder is given by $V(a, \theta) = V_a \sin \theta$ and on the outer cylinder $V(b, \theta) = V_b \cos 3\theta$, where θ is the polar angle (measured from the x-axis). Obtain an expression for $V(r, \theta)$ in the region between the two cylinders.