

SECOND MIDTERM

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Discussion Section # _____

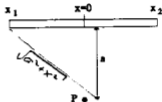
SHOW ALL WORK!!!!

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

Use the conversion constants and data given on the front page.

A rod of nonconductor has a charge density given by $\lambda = +Ax$. The charge is positive on either side of $x = 0$. A is a constant. Calculate the electric potential at point P , a distance a away from the midpoint of the rod. Take the midpoint as $x = 0$.

$x_1 = -L/2$
 $x_2 = +L/2$



$$dV = \frac{k \lambda dx}{r} = \frac{k \lambda dx}{\sqrt{a^2 + x^2}}$$

$$\int dV = 2 \int_0^{L/2} \frac{k Ax dx}{\sqrt{a^2 + x^2}}$$

$$V = 2kA \left[\sqrt{a^2 + x^2} \right]_0^{L/2}$$

$$V = 2kA \left(\sqrt{a^2 + \frac{L^2}{4}} - a \right)$$

IS Method

IO calc

-S for $V=0$ due to $\lambda = Ax$
 $n_2 = A/x$