1(a) For an infinite, uniformly charged, straight line (wire #1)

$$|\vec{E}| = \frac{\lambda}{2\pi\varepsilon_0 l} = \left(\frac{1}{4\pi\varepsilon_0}\right)\frac{2\lambda}{l}$$ 1

so $\vec{E} = \left(\frac{1}{4\pi\varepsilon_0}\right)\frac{2\lambda}{l}\,\hat{\imath}$ for this coordinate system

so

$$\vec{E}\left(\tfrac{1}{2},0,0\right) = \left(\frac{1}{4\pi\varepsilon_0}\right)\frac{2\lambda}{(d/2)}\,\hat{\imath}$$

$$= \frac{\left(8.99\times10^{9}\ \mathrm{Nm^2/C^2}\right)(2)\left(-2.0\times10^{-9}\ \mathrm{C/m}\right)}{\left(\frac{1}{2}\ \mathrm{m}\right)}\,\hat{\imath}$$

$$= \left[(8.99)(8)\ \mathrm{N/C}\right](-\hat{\imath})$$

$$= \left(-72\ \mathrm{N/C}\right)\hat{\imath}$$

1 1 1

$$\vec{E}\left(\tfrac{1}{4},0,0\right) = \frac{\left(8.99\times10^{9}\ \mathrm{Nm^2/C^2}\right)(2)\left(10^{-9}\ \mathrm{C/m}\right)}{\left(\frac{1}{4}\ \mathrm{m}\right)}\,\hat{\imath}$$

$$= \left(+72\ \mathrm{N/C}\right)\hat{\imath}$$

1 1 1