1. A $-5.0 \ \mu C$ charge is moving at a constant speed of 1×10^5 m/s in the $(+x)$-direction. At the instant the point charge is at the origin, what is the magnetic field it produces at the point $(x = 0.5\text{m}, y = 0.5\text{m})$? [Hint: the answer is a vector.]

[5 pts]

$-5.0\mu C \xrightarrow{\qquad\qquad} v = (1 \times 10^9) \ m/s$

$$\vec{B} = \frac{\mu_0}{4\pi} \cdot \frac{q \vec{v} \times \vec{r}}{r^3} \qquad \begin{array}{l} \hat{x} \times \vec{x} = 0 \\ \hat{x} \times \vec{y} = \hat{z} \ \hat{k} \end{array}$$

$$= \frac{\mu_0}{4\pi} \cdot \frac{(-5.0 \times 10^{-6} C) \cdot (1 \times 10^5 \, m/s)(0.5m)}{\left(\sqrt{0.5^2 + 0.5^2}\right)^3}$$

$$= - 7.1 \times 10^{-3} \, T \ \hat{k}$$