

Name: _____

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Calculators Not Allowed
No Work = No Credit
Write Legibly

Question	Points	Score
1	10	
2	10	
Total:	20	

1. 10 points A particle with charge q is traveling with constant velocity \vec{v} , where $v \ll c$ and $c = \frac{1}{\sqrt{\epsilon_0 \mu_0}}$ is the speed of light (we will learn this later in the course). Write an expression for the magnetic field, \vec{B} , that the particle generates, in terms of the electric field \vec{E} and speed of light c .
2. 10 points Set up an expression for the net force on the wire (curve) $y = f(x)$, where $x_1 \leq x \leq x_2$ lies in the $z = 0$ plane and carries a current I (see Fig. 1). Assume that there is a non-uniform magnetic field $\vec{B} = \vec{B}(x, y, z)$ in the region of space where the wire lies.

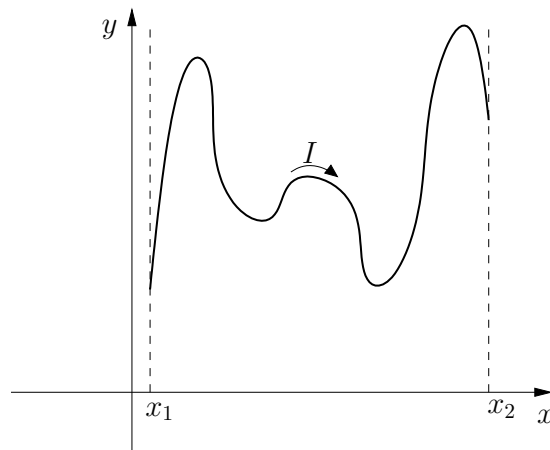


Figure 1: An arbitrary wire (curve), $y = f(x)$, carrying a current I (as indicated on the diagram) is shown.