NAME:	Quiz #1b:
Solution	Phys270

1. A wire is attached to two springs with a combined spring constant k. The wire is partially located in a uniform magnetic field Bo directed out of the page over a length L. A current I is applied to the wire which causes the wire to deflect by a distance x.
   a. [2 pts] What is the direction of the magnetic field at point P produced by the current in the wire? Draw it on the diagram.
   b. [2 pts] What direction does the wire deflect? Draw it in the diagram.
   c. [6 pts] What is the magnitude of the deflection x in terms of Bo, k, I, and L?

B$_o$

L

Point P

I
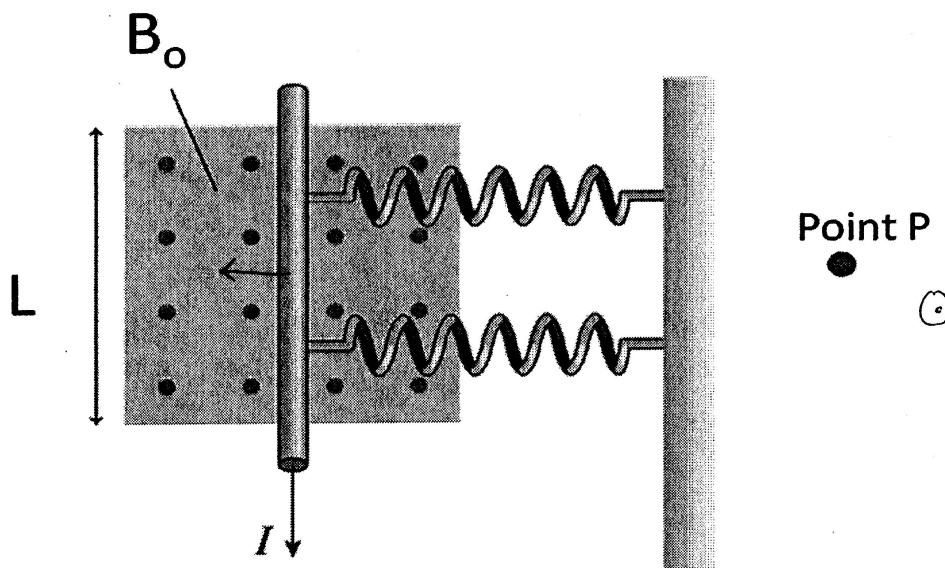
(a) Pointing the thumb of right hand along I, the fingers curl-
so field is coming out of the plane of paper at P. ©

(b) $\vec{F} = I\vec{\ell} \times \vec{B}$. Again by right-hand rule, $\vec{F}$ is to the left

(c) The total spring constant is "k", which includes the effect
both springs. For the deflected wire, the force du
spring must balance the force due to magnetic field

$$\Rightarrow \quad B_o \ell I = k x$$

$$\Rightarrow x = \frac{B_o \ell I}{k}$$