PHYS 102: General Physics 2 **KOÇ UNIVERSITY** **Spring Semester 2014**

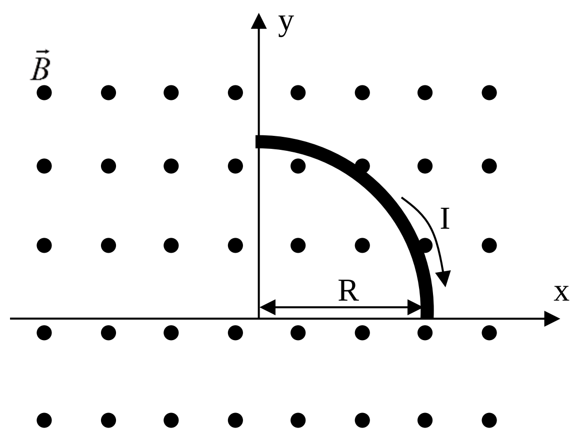
College of Sciences

Section 1 **Quiz 8** **3 April 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: **Student ID:** **Signature:**

In figure below the magnetic field $\vec{B}$ is uniform and perpendicular to the plane of the figure, pointing out. The conductor is a quarter of a circle with radius *R*, carrying a current *I*. Find the magnitude and direction of the total magnetic force on the conductor?



PHYS 102: General Physics 2 **KOÇ UNIVERSITY** **Spring Semester 2014**

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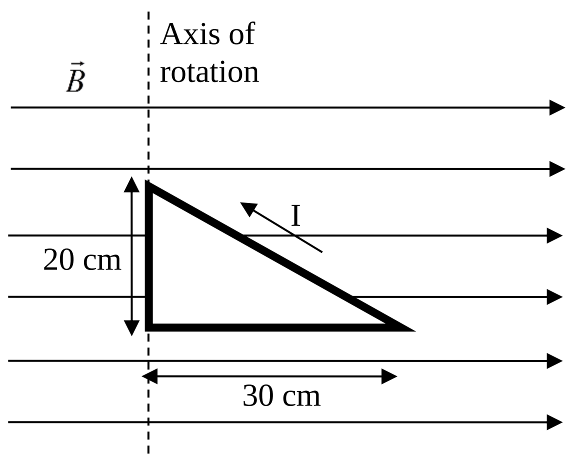
Section 2 **Quiz 8** **3 April 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: **Student ID:** **Signature:**

A right triangular coil of wire with dimensions shown in figure below carries a current of 1 A (direction counterclockwise as shown in the figure). The coil is initially oriented with the plane of its loop parallel to a uniform 1.50 T magnetic field. The coil is free to rotate about the axis of rotation shown below. Find the magnitude and direction of the torque acting on the coil at the time instant shown in figure below.



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Section 3 Quiz 8 3 April 2014

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: Student ID: Signature:

Starting from the equation for the magnetic force acting on a single charge carrier with charge q and velocity $\vec{v}$ ($\vec{F} = q\vec{v} \times \vec{B}$) obtain the relation for the force acting on a straight wire with length L carrying current I ($\vec{F} = I\vec{L} \times \vec{B}$). Hint: You should assume all charge carriers (with charge q and velocity $\vec{v}$) that are in the conductor and find out the total magnetic force acting on all charge carriers. Assume a density of charge carriers n.

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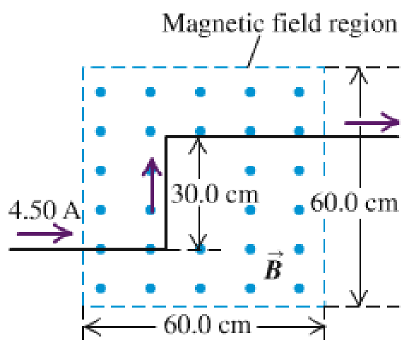
Section 4 Quiz 8 3 April 2014

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: Student ID: Signature:

A long wire carrying 4.5 A of current makes two 90º bends, as shown in figure below. The bent part of the wire passes through a uniform 0.24 T magnetic field directed as shown in the figure and confined to a limited region of space. Find the magnitude and direction of the force that the magnetic field exerts on the wire.



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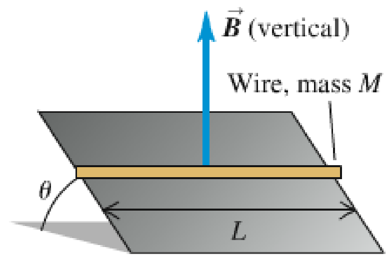
Section 5 Quiz 8 4 April 2014

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: Student ID: Signature:

A straight piece of conducting wire with mass M and length L is placed on a frictionless incline incline tilted at an angle θ from the horizontal (see figure below). There is a uniform, vertical magnetic field $\vec{B}$ at all points. To keep the wire from sliding down the incline, a voltage source is attached to the ends of the wire. When just the right amount of current flows through the wire, the wire remains at rest. Determine the direction and magnitude of the current in the wire that will cause the wire to remain at rest.



PHYS 102: General Physics 2 **KOÇ UNIVERSITY** **Spring Semester 2014**

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Section 6 **Quiz 8** **3 April 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: **Student ID:** **Signature:**

A thin, 50cm long metal bar with mass 750g rests on, but is not attached to, two metallic supports in a uniform 0.45T magnetic field, as shown in figure below. A battery and a 25Ω resistor in series are connected to supports. (a) What is the highest voltage the battery can have without breaking the circuit at the supports? (b) If the resistor suddenly gets partially short-circuited, decreasing its resistance to 2Ω, find the initial acceleration of the bar. (Take $g=10\ m/s^2$)