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

College of Arts and Sciences

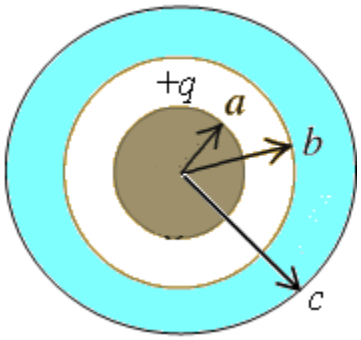
Section 1 **Quiz 2** **20February 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes

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

A solid conducting sphere carrying charge q has radius a. It is inside a concentric hollow conducting sphere with inner radius b and outer radius c. The hollow sphere has no net charge.

(a) Derive expressions for the electric field magnitude in terms of the distance r from the center fort he regions $r < a$, $a < r < b$, $b < r < c$, and $r > c$.
(b) Graph the magnitude of the electric field as a function of r from $r = 0$ to $r = 2c$.
(c) What is the charge on the inner surface and on the outer surface of the hollow sphere?



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

College of Arts and Sciences

Section 2 **Quiz 2** **20February 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes

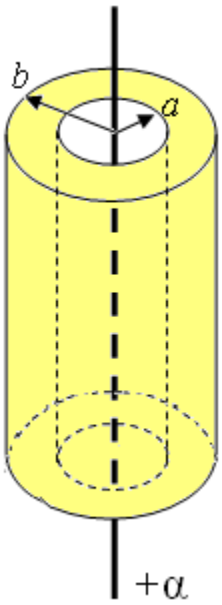
Name: **Student ID:** **Signature:**

A very long conducting tube (hollow cylinder) has inner radius *a* and outer radius *b*. It carries charge per unit length $+\alpha$, where α is the positive constant with units of C/m. A line of charge lies along the axis of the tube. The line of charge has charge per unit length +α.

(a) Calculate the electric field in terms of α and the distance *r* from the axis of the tube for r < a , a < r < b and r > b.

(b) Graph the electric field magnitude as a function of *r* in all the regions?

(c) What is the charge per unit length on (i) the inner surface of the tube and (ii) the outer surface of the tube? (Tube is the conducting hollow cylinder.)



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

College of Arts and Sciences

Section 3 **Quiz 2** **20February 2014**

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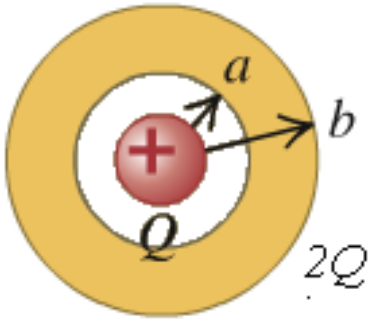
Quiz duration: 15 minutes

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

A conducting spherical shell with inner radius *a* and outer radius *b* contains a total charge *2Q* .A positive point charge *Q* is located at the center of the spherical shell.

(a) Derive the expression for the electric field magnitude as a function of the distance *r* from the center for the regions $r < a$, $a < r < b$, and $r > b$.
(b) Graph the electric field magnitude as a function of *r*.
(c) What is the charge on the inner surface and on the outer surface of the conducting spherical shell?



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

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Section 4 **Quiz 2** **20February 2014**

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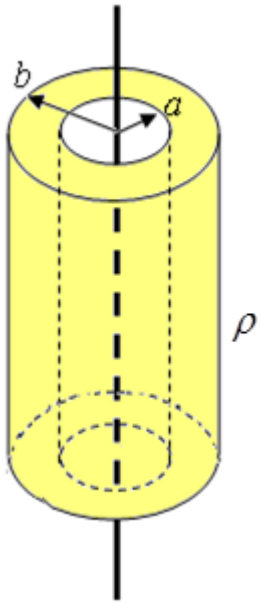
Quiz duration: 15 minutes

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

A very long hollow cylinder with inner radius a and outer radius b has positive charge uniformly distributed throughout, with charge per unit volume ρ.

(a) Derive expressions for the electric field magnitude in terms of the distance r from the center for the regions $r < a$, $a < r < b$, and $r > b$.

(b) Graph the magnitude of the electric field as a function of r.



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

College of Arts and Sciences

Section 5 **Quiz 2** **20February 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes

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

A very long, solid cylinder with radius R has positive charge uniformly distributed throughout it, with charge per unit volume ρ.

(a) Calculate the electric field in terms of the charge density ρ and the distance r from the axis of the cylinder for $r < R$ and $r > R$.
(b) Graph the electric-field magnitude as a function of r from $r = 0$ to $r = 3R$.

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Section 6 **Quiz 2** **20February 2014**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes

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

An insulating spherical shell with inner radius a and outer radius b has positive charge uniformly distributed throughout, with charge per unit volume ρ.

(a) Derive expressions for the electric field magnitude in terms of the distance r from the center for the regions $r < a$, $a < r < b$, and $r > b$.

(b) Graph the magnitude of the electric field as a function of r.