**Name** _____

PHY2049C, Practice Quiz 4

A- Read all the quiz once, or twice, before beginning to write. Make sure to comprehend all questions and start with those you feel most confident.
B – Be clear and concise. There are no extra points for being verbose or writing extra.
C –Only use the white pages that I will provide. You have 50 minutes to answer the quiz.

Problem 1 (Halladay, Resnik, Walker)

The Figure shows cross sections through three long conductors of the same length and material, with square cross sections of edge lengths as shown. Conductor B fits snugly within conductor A, and conductor C fits snugly within conductor B. Rank the following according to their end-to-end resistances, greatest first: the individual conductors and the combinations of A + B (B inside A), B + C (C inside B), and A + B + C (B inside A inside C).
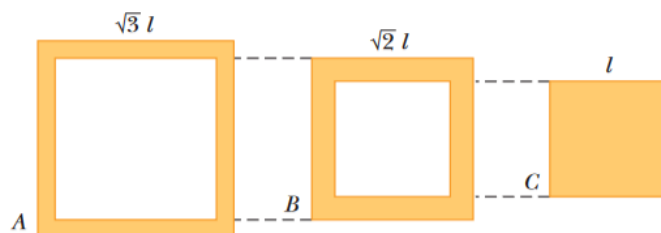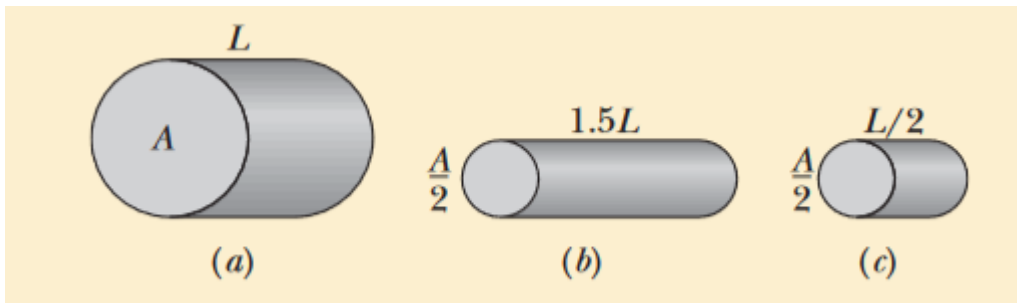

Problem 2

On Day 1, there were 490 kids in two groups. Group A consistent only of boys, and B only of girls. There were 2 and a half more girls than boys. On Day 2, more girls joined group B, and for each 4 boys in group A, 32 boys joined group A. The total number of girls resulted in 1/3 that of boys. Express the number of girls that joined group B in terms of a fraction of the boys that joined group A on Day 2.

Problem 3 (Extra)

How long does it take electrons to get from a car battery to the starting motor? Assume the current is 300 A and the electrons travel through a copper wire with cross-sectional area 0.21 cm^2 and length 0.85 m. The number of charge carriers per unit volume is 8.49 x 10^{28} m^{-3}.

Problem 4 (Extra)

The figure here shows three cylindrical copper conductors along with their face areas and lengths. Rank them according to the current through them, greatest first, when the same potential difference V is placed across their lengths

(a) (b) (c)

Problem 5 (Extra)

Figure a shows a rod of resistive material. The resistance per unit length of the rod increases in the positive direction of the x axis. At any position x along the rod, the resistance dR of a narrow (differential) section of width dx is given by dR = 5.00x dx, where dR is in ohms and x is in meters. Figure b shows such a narrow section. You are to slice off a length of the rod between x 0 and some position x = L and then connect that length to a battery with potential difference V = 5.0 V (Figure c). You want the current in the length to transfer energy to thermal energy at the rate of 200 W. At what position x = L should you cut the rod?