This print-out should have 7 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

PLEASE REMEMBER THAT YOU MUST CARRY OUT YOUR CALCULATIONS TO AT LEAST THREE SIGNIFICANT FIGURES. YOUR ANSWER MUST BE WITHIN ONE PERCENT OF THE CORRECT RESULT TO BE MARKED AS CORRECT BY THE SERVER.

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001 (part 1 of 2) 3 points

The current

$$I = a\,t^2 - b\,t + c$$

in a section of a conductor depends on time.

What quantity of charge moves across the section of the conductor from $t = 0$ to $t = t_1$?

1. $q = a\,t_1^3 - \dfrac{b}{2}\,t_1^2 + c\,t_1$

2. $q = \dfrac{a}{3}\,t_1^3 - \dfrac{b}{2}\,t_1^2 + c\,t_1$

3. $q = a\,t_1^3 - b\,t_2 + c\,t_1$

4. $q = a\,t_1^2 - b\,t_1 + c$

5. $q = \dfrac{a}{3}\,t_1^3 - \dfrac{b}{2}\,t_1^2 + c$

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002 (part 2 of 2) 8 points

If I is in A, and $a = 3$ C/s^3, $b = 3$ C/s^2, and $c = 19$ C/s, what quantity of charge moves across the section of the conductor from $t_1 = 2$ s to $t_2 = 4$ s? Answer in units of C.

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003 (part 1 of 1) 8 points

Calculate the average drift speed of electrons traveling through a copper wire with a cross-sectional area of 50 mm^2 when carrying a current of 99.9999 A (values similar to those for the electric wire to your study lamp). Assume one electron per atom of copper contributes to the current. The atomic mass of copper is 63.5 g/mol and its density is 8.93 g/cm^3. Avogadro's number N_A is 6.02×10^{23}. Answer in units of m/s.

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004 (part 1 of 1) 8 points

A 0.79 V potential difference is maintained across a 0.7 m length of tungsten wire that has a cross-sectional area of 0.34 mm^2 and the resistivity of the tungsten is $5.6 \times 10^{-8}\ \Omega \cdot$ m.

What is the current in the wire? Answer in units of A.

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005 (part 1 of 1) 8 points

A wire with a resistance R is lengthened to 7.66 times its original length by pulling it through a small hole.

Find the resistance of the wire after it is stretched. Answer in units of R.

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006 (part 1 of 2) 8 points

An electric heater operating at full power draws a current of 11.2 A from a 118 V circuit.

What is the resistance of the heater? Answer in units of Ω.

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007 (part 2 of 2) 7 points

Assuming constant R, how much current should the heater draw in order to dissipate 820 W? Answer in units of A.