

2049H Exam 2

Spring 2010

Name:

#1

#2

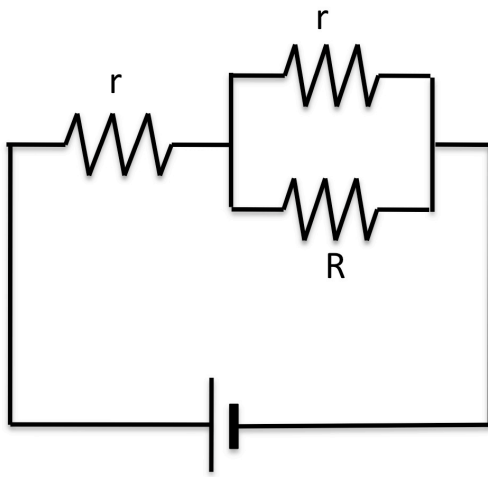
#3

#4

#5

Total:

Problem 1:

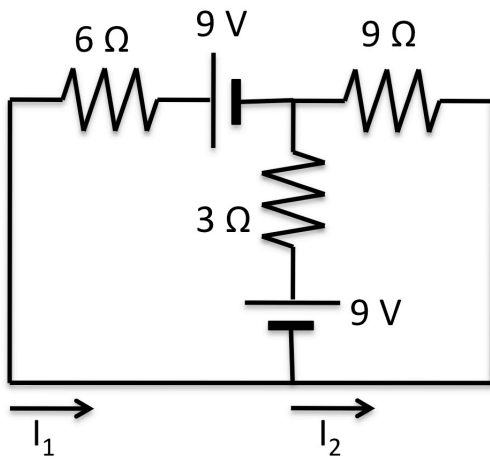


A battery with voltage V supplies current to the circuit shown below. There are three resistors: r is a constant resistor while R is a variable resistor.

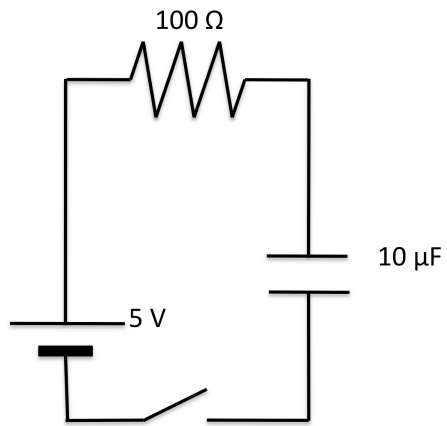
- (a) Find R such that the power dissipation thru the variable resistor is maximized.
- (b) What is the maximum power dissipation through the variable resistor?

Problem 2

Find I_1 and I_2 .



Problem 3

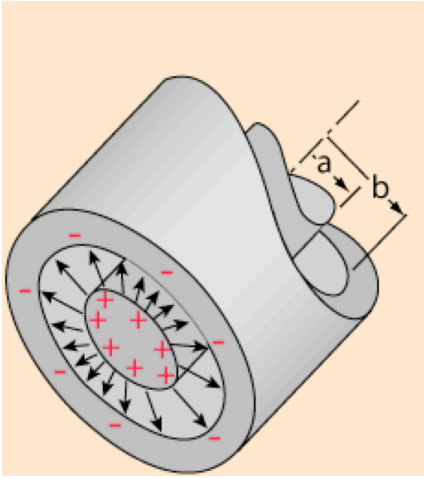


At $t=0$ sec the switch is closed.

Calculate current through the resistor

- (a) at $t=0$ second
- (b) at $t=1$ millisecond
- (c) at $t=\text{infinity}$ seconds

Problem 4



(a) Calculate the capacitance per unit length for the cylindrical capacitor as shown left. The inner space between the conductors is vacuum.

(b) Calculate the energy stored per unit length if the inner conductor is charged to voltage V with respect to the outer conductor.

Problem 5 Calculate the capacitance of a spherical shell with radius R .