Name: _____ §#:

Show all work clearly and in order, and box your final answers. Simplify your expressions as best you can. Use the back of the sheet if you need to. You have 10 minutes to take this quiz.

CIRCUIT DIAGRAM - Your problem concerns the circuit diagram on the opposite side.

1. (*1 point*) What is ΔV_{ab}?

$$\boxed{\Delta V_{ab} = 0}$$

Since we are just along a wire.

2. (*1 point*) What is ΔV_{af}?

$$\boxed{\Delta V_{af} = 10V}$$

Since this is just the voltage of the battery.

3. (*1 point*) What is ΔV_{be}?

$$\boxed{\Delta V_{be} = 10V}$$

This is the same as the part above, as we have just added some wire.

4. (*5 points*) What is the current running through the battery? Be sure to tell me or indicate the direction on the diagram. Be sure to show all of your work.
So in general, this can be solved as all circuits can, by applying Kerchoff's Laws and solving the system of equations. In this particular case however, we have a balanced bridge, so if we use a little forethought we see that the current through the 5Ω resistor should be zero. At this point we have two parallel branches each with two series resistors, so we can just combine the resistances and solve directly. The equivalent resistance is

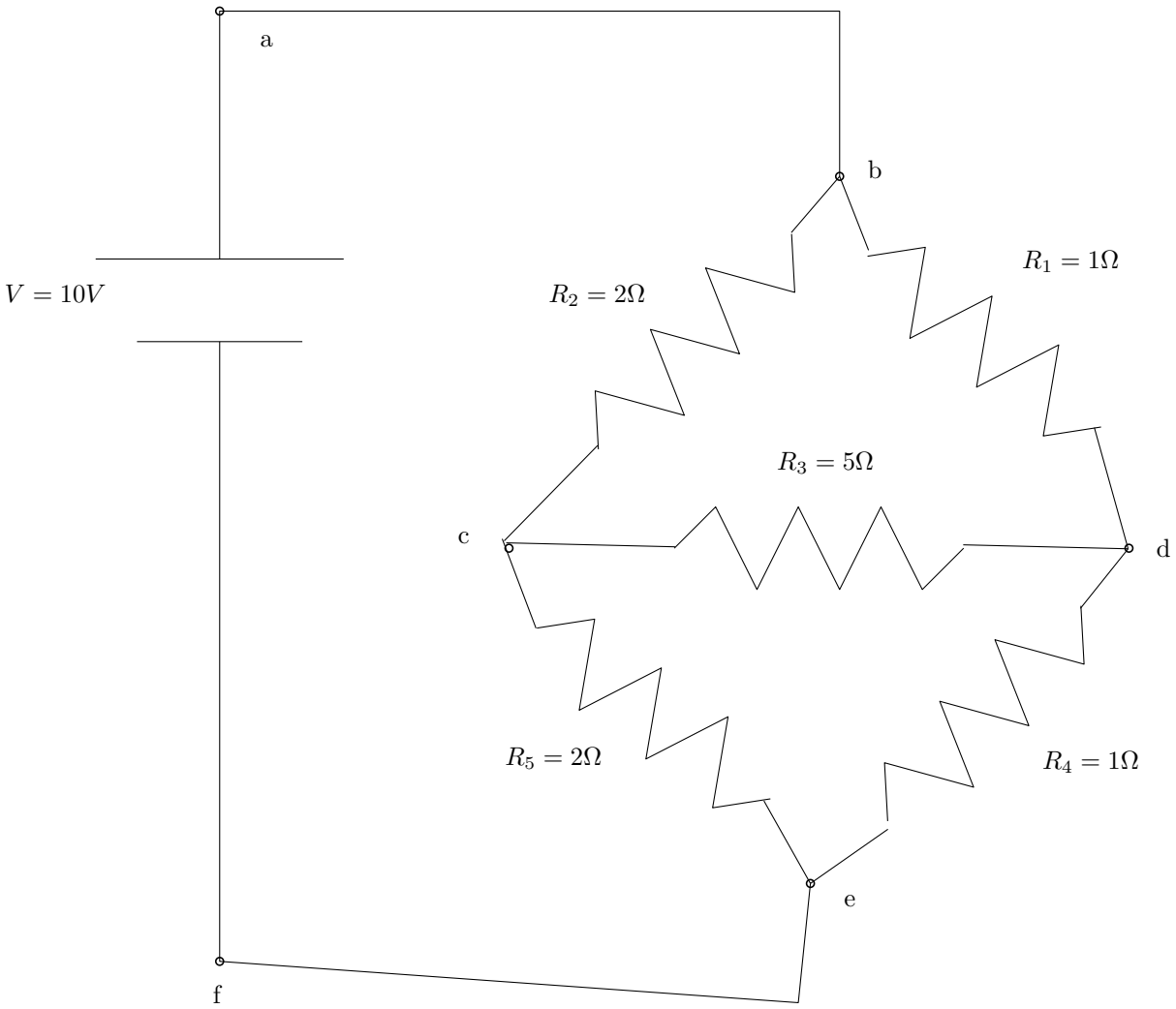
$$R_{eq} = \frac{1}{\frac{1}{2+2} + \frac{1}{1+1}} = \frac{4}{3}$$

at which point we can use the rule for a resistor to find V = I R
$10 = \mathrm{I}\ 4_{\overline{3}}$ which gives us

$$\boxed{I = 7.5A}$$

5. (*2 points*) What is the equivalent resistance of the collection of resistors?
Using the approach I used above, we've already solve this question, we have

$$\boxed{R_{eq} = \frac{4}{3}\Omega}$$


a
b
$V = 10V$
$R_1 = 1\Omega$
$R_2 = 2\Omega$
$R_3 = 5\Omega$
c
d
$R_5 = 2\Omega$
$R_4 = 1\Omega$
e
f