

96. (Fourth problem of **Cluster**)

- (a) The symmetry of the problem allows us to use i_2 as the current in *both* of the R_2 resistors and i_1 for the R_1 resistors. We see from the junction rule that $i_3 = i_1 - i_2$. There are only two independent loop rule equations:

$$\begin{aligned}\mathcal{E} - i_2 R_2 - i_1 R_1 &= 0 \\ \mathcal{E} - 2i_1 R_1 - (i_1 - i_2) R_3 &= 0 \quad .\end{aligned}$$

where in the latter equation, a zigzag path through the bridge has been taken. Solving, we find $i_1 = 0.002625$ A , $i_2 = 0.00225$ A and $i_3 = i_1 - i_2 = 0.000375$ A. Therefore, $V_A - V_B = i_1 R_1 = 5.25$ V.

- (b) It follows also that $V_B - V_C = i_3 R_3 = 1.50$ V.
(c) We find $V_C - V_D = i_1 R_1 = 5.25$ V.
(d) Finally, $V_A - V_C = i_2 R_2 = 6.75$ V.