

Mandatory Programming Assignment No 1 (5 marks, Deadline 28 Feb)

Task: Compute the equivalent resistance of a 2 terminal **reducible** network of resistors

Let us call a network 2 terminal *reducible* if it is a graph G_{ab} between terminals a and b constructed using the following rules:

- G_{ab} is a simple resistor between a and b
- If G_{ab} and G_{bc} are 2 terminal reducible, then G_{ac} is 2 terminal reducible constructed by putting G_{ab} and G_{bc} in series
- If G_{ab} and G'_{ab} are 2 terminal reducible, then G''_{ab} is 2 terminal reducible constructed by putting G_{ab} and G'_{ab} in parallel
- If G_{ab} , G_{bc} , G_{cd} , G_{da} , G_{bd} are five 2 terminal reducible networks, then the network constructed by putting these 5 into a composite network (resembling a wheatstone bridge - i.e. a diamond with diagonal connected) is 2 terminal reducible between a and c .

Key steps:

- If the graph (or any of its subgraphs) is a series parallel graph, then it (or that part) can be reduced step by step to a single resistance value
- If not, the graph contains a wheatstone bridge type circuit (a diamond with a resistor across the diagonal).

Apply Delta-Star transform on this so that that part become series-parallel and can be reduced

Input file:

Line 1 contains 4 numbers separated by a single space:

no_of_nodes no_of_edges start_terminal_num end_terminal_num

Lines 2 onwards contain edges - each line contains 3 numbers separated by a single space:

node_num_1 node_num_2 res_value,

which represents a resistance of value res_value between $node_num_1$ and $node_num_2$

Output file should contain a single line with a single number rounded off to exactly two decimal places (for instance if the equivalent resistance is 23 then report it as 23.00, equivalent resistance $100/3$ is reported as 33.33 and $100/6$ is reported as 16.67).

NOTE: Maintain all the intermediate resistance values in floating point form and round off to two decimal places only when reporting the result to the output file.

Details of how to submit into the portal will be announced shortly. Your code will be tested against test cases that will be generated by us (not visible to you), and marks will be based on your code quality and number of test cases it passes.