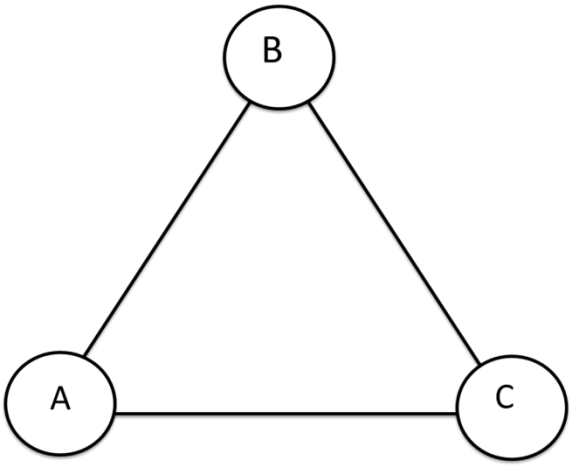
EBF 483, Summer 2017
Lesson 7 Deliverable

Questions 1 and 2 refer to the three-node network below. There are generators at nodes A and B, with a load at node C. ***All resistances in the network are identical****.*



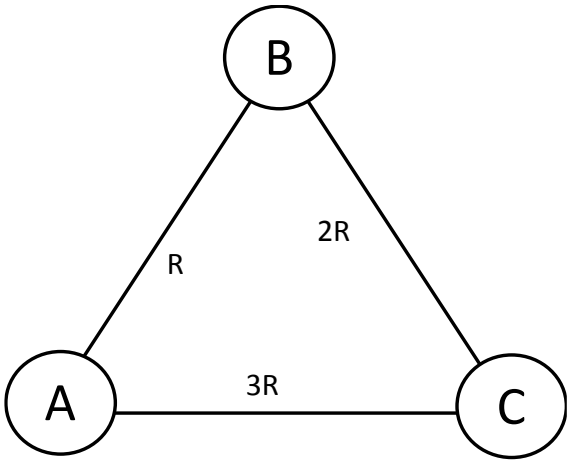
1. Suppose that the marginal costs of the two generators are $MC(G_A)$ = \$5/MWh at Node A and $MC(G_B)$ = \$15/MWh at Node B. Generator A has a maximum capacity of 15 MW and Generator B has a maximum capacity of 15 MW. Demand at node C is 25 MWh. Flow constraints on the transmission lines are:

   Line (A,C) = 13 1/3 MW maximum
   Line (B,C) = 25 MW maximum
   Line (A,B) = 25 MW maximum

   Assuming that the generators submit competitive supply offers (equal to marginal costs), calculate LMPs at each node of the network.

2. Now, suppose that demand rises to 26 MWh. You should find that the economic dispatch violates the flow constraint on Line (A,C). Using the method from class, find a redispatch of the two generators that will respect the transmission constraint on line (A,C) and calculate the LMPs at each node. How much congestion revenue does the RTO collect?

The next two questions are based on the three-node network shown in the figure below. There are two generators, one each located at nodes A and B. Customers are located at node C. The marginal costs of the two generators are $MC(G_A)$ = \$10/MWh and $MC(G_B)$ = \$20/MWh. The two generators can produce a maximum of 10 MW each.



3. Suppose that day-ahead electricity demand was expected to be 9 MWh during some hour, and that the generators submitted supply offers equal to marginal cost. Calculate the quantity cleared by each generator in the day ahead market, flows on the three transmission lines and the day-ahead Locational Marginal Prices at each of the three nodes.

4. Now, suppose that when the RTO runs the real-time market it expects demand to be 10 MWh during this same hour. Suppose also that the flow constraint on line (A,C) was 4.5 MWh, and assume that the flow constraints on the other two lines are so high that they would never become overloaded. Using the method from class, find a redispatch of the two generators that will respect the transmission constraint on line (A,C) and calculate the real-time LMPs at each node. Calculate the payments to each of the two generators for this hour under the two-settlement system.