

Problem Set 9

Out: Wednesday, November 3, 2004.

Due: Wednesday, November 10, 2004.

Consider a three-bus network where each pair of buses are connected by a line with reactance 1. The generators are located at buses A and B, and the consumers are located at bus C. The basic data of this economy is summarized as follows:

- Bus A's generator is characterized by the cost function $c_A(q) = 10q + q^2$
 - Bus B's generator is characterized by the cost function $c_B(q) = 6q + 2q^2$
 - Bus C's load is characterized by the utility function: $m + (412 - x)x$.
1. Calculate the generators' supply functions and the consumers' demand function.
 2. Formulate and solve the optimal dispatch problem, assuming that there are no transmission constraints.
 3. Assuming that the line connecting buses A and B is constrained to carry no more than 6 units:
 - (a) Formulate and solve the optimal dispatch problem
 - (b) Calculate the nodal prices that decentralize the optimal dispatch?
 - (c) What is the associated price of transmission?
 - (d) What are the transmission rents?