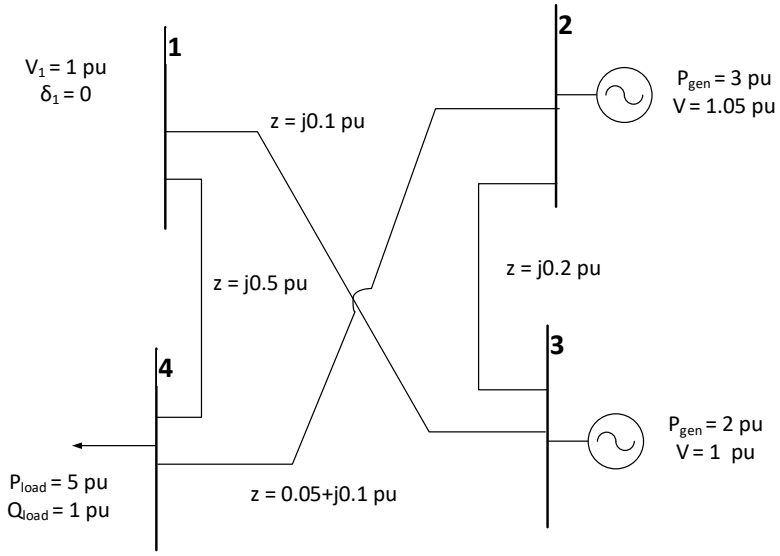
Tutorial 7

Consider the following system. The impedances (branches) between busses could represent lines or transformers in per unit.



- Identify bus types in this system
- Set up the X vector
- Set up Y_{bus}
- Write the equation f_1 (Real power flow equation at bus 1)

Power flow equations with Y_{bus} expressed in rectangular coordinates:

$$f_i = P_{gen,i} - P_{load,i} - \sum_{k=1}^{N} V_i V_k G[i,k] \cos(\delta_i - \delta_k) - \sum_{k=1}^{N} V_i V_k B[i,k] \sin(\delta_i - \delta_k)$$

$$f_{N+i} = Q_{gen,i} - Q_{load,i} - \sum_{k=1}^{N} V_i V_k G[i,k] \sin(\delta_i - \delta_k) + \sum_{k=1}^{N} V_i V_k B[i,k] \cos(\delta_i - \delta_k)$$