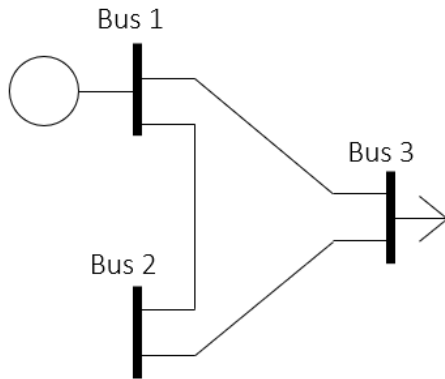


Name: _____ UIN: _____ Section: _____ Score: _____



In this three-bus system

- The line from bus 1 to bus 2 has an impedance $Z = 0.05 + j0.1$
- The other two lines (1-3 and 2-3) both have an impedance $Z = j0.25$
- The load at bus 3 is consuming 150 MW and 87 Mvar
- The generator at Bus1 has a voltage setpoint of 1.03 per-unit

1. Make the Y-bus matrix for this system

$$Y = \begin{bmatrix} 4 - j12 & -4 + j8 & j4 \\ -4 + j8 & 4 - j12 & j4 \\ j4 & j4 & -j8 \end{bmatrix}$$

2. Which bus must be the slack bus?

Bus 1 (slack bus must be a generator)

3. Make the B matrix and the P vector that would be used for the DC power flow (no need to solve). For the P vector, use the sign convention of power leaving the bus (loads are positive).

$$B = \begin{bmatrix} -12 & 4 \\ 4 & -8 \end{bmatrix}$$

$$P = \begin{bmatrix} 0 \\ 1.5 \end{bmatrix}$$