# ECEN 615 Fall 2023 Assignment #1 Due 13 September 2023

Using a programming environment of your choice, such as Python with Scipy or Matlab, write a Newton-Raphson power flow and use it to solve the five-bus system presented in class. You can hard code the five-bus system data in your program, or read it from text files. The input is the per-unit power for the PQ buses, the voltage set points for the generators, and the transmission line and transformer pi-model parameters. You need to code PQ, PV, and a slack bus. You do not need to code generator reactive power limits. Use a flat start initial guess, except set PV bus voltages to the generator set point voltages.

Your output should be a list of the bus voltage magnitudes and angles at each iteration. Also calculate the reactive power output for the generators and the real power output for the slack bus generator. Use a 100 MVA per unit base, and use a per unit convergence value of 0.1 MVA. Turn in a listing of your code and the complete output of your program, along with a short description of your approach, up to 300 words.