# ECEN 615 Problem Set #4 Fall 2018
# Due 11/1/18

1. Code the Tinney Scheme 1 algorithm, and test your algorithm using the Aggieland37 bus network from the course website (in the Lecture 7 zip file). Note, you to not have to actually code adding the fills for this problem. Turn in a listing of your program and the Tinney Scheme 1 numbering for this case. Break ties numerically (i.e., bus 1 before bus 2). Note, to solve this problem you just need the connection topology, not the actual matrix values. There are several ways to get the data needed for this case from PowerWorld. One is to select Case Information, Solution Details, Ybus. Then right-click on any data cell and select Save Ybus in Matlab format. That will give you a text file description of the Ybus.

For problems 2 to 6 make use of the B7Flat_DC case, which is available on the course website. This case is a modified version of the B7Flat case in which 1) the lines are modeled just using reactances, 2) the case is solved using the dc power flow, and 3) some of the line limits have been increased. Assume the initial injections for this case to be the base case values. Bus 7 is the system slack. For consistency please use the line numbering and from/to bus orientations given for the case. For convenience the line ordering is given at the end of this problem set in Table 1. That is, the line from bus 1 to bus 2 is #1, the line from bus 1 to bus 3 is #2, etc.

2. Using PowerWorld, determine the UTC between bus 2 and the system slack (bus 7). Consider all single line contingencies. For convenience the eleven single element contingencies have already been defined for you.

3. Using a matrix package such as Matlab, calculate the injection shift factor (ISF) matix.

4. Using your results from question 2, calculate the PTDFs on all the lines for a transaction between bus 2 and bus 7.

5. Calculate the LODFs on all lines for the outage of the line between buses 2 and 5.

6. Calculate the LODFs on all the lines for the double outage of the line between buses 2 and 5 and the line between buses 2 and 4

7. Extra Credit Problem: Code the Tinney Scheme 2 algorithm, which requires that you actually add the fills. Then test your algorithm using the 37 bus network from problem 4. Turn in a listing of your program and the Tinney Scheme 2 numbering for this case. Break ties numerically (i.e., bus 1 before bus 2).

**Table 1: B7Flat_DC Transmission Line Values**

| Line Number | From Number | To Number | Circuit | X | Lim A MVA |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 1 | 0.06 | 200 |
| 2 | 1 | 3 | 1 | 0.24 | 200 |
| 3 | 2 | 3 | 1 | 0.18 | 80 |
| 4 | 2 | 4 | 1 | 0.18 | 100 |
| 5 | 2 | 5 | 1 | 0.12 | 150 |
| 6 | 2 | 6 | 1 | 0.06 | 200 |
| 7 | 3 | 4 | 1 | 0.03 | 100 |
| 8 | 4 | 5 | 1 | 0.24 | 60 |
| 9 | 7 | 5 | 1 | 0.06 | 200 |
| 10 | 6 | 7 | 1 | 0.24 | 200 |
| 11 | 6 | 7 | 2 | 0.24 | 200 |