HOMEWORK #2, Due Monday, Jan 26.

1. Use the equations at the bottom of slide 7, which are:
2. Now, just bring the right hand side of these 2 equations over to the left-hand side, and you have the 2 equations that correspond to G(y,p)=0.
3. Solve these equations to get the corresponding power flow solution (but you do not need Newton-Raphson to do this – you can just use the equation at the bottom of slide 10). Use V1=1, PD=0.4, pf=0.97 lagging, B=1 as the operating conditions.
4. Now you need to replace the value specified in the equations for PD (assuming that the initial load is 0.4) with 0.4*lambda. This gives you the equations in the form of slide 49: 0=G(theta,V,lambda). Note, however, that G is really two equations: G1 and G2. Again, use V1=1.0, pf=0.97 lagging, and B=1.0.
5. Now you need to formulate the equations on the slide 55. This is a matter of taking derivatives and then evaluating those derivatives at the solution that you obtained above. Note, however, that each element in the matrix of slide 55 actually represents 2 elements. That is:
   | dG1/dtheta   dG1/dV   dG1/dlambda|
   | dG2/dtheta   dG2/dV   dG2/dlambda|
   | 0   0   1 |
6. Evaluate each of the above matrix elements at the solution obtained in step 3.
7. Then solve these equations for the tangent vector. You can do this by inverting the above matrix (use matlab or a calculator to do this) and then multiply the right-hand-side by this inverted matrix.
8. Then take a "step" using an appropriately chosen step size per the equation on slide 56.
9. Beginning from your predicted point that you identified in step 8 of #2a, develop equations for approach a, solve them, and identify the resulting corrected point in terms of voltage and power.
10. Repeat #9 except implement approach b.