**Chapter 6 suggested homework problems - solutions**

As a power systems engineer, you will probably never have to solve a power flow problem by hand any more. However, it is a good idea to know how the various methods, such as Gauss-Seidel and Newton-Raphson, work and their advantages and disadvantages. This short home work assignment will help with that understanding.

6.14. Here is a Gauss-Seidel practice problem. Remember to rewrite the equation in a way that you can use Gauss-Seidel. Then see how many steps it takes to converge on one of the roots. Then, see if you can use a different initial value to converge on a different root. Note that the exact roots are 4, 1, 1.

Graphical user interface, text, application

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It turns out that there is just a small range of initial values for which this will converge on the root 4. There are NO initial values for which this converges on the root 1.

6.24. Here is a simple Newton-Raphson practice problem. Keep track of the error term ε on each pass and stop when ε < 0.001.

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6.36. This problem is just a small taste of what a simulator like PowerWorld is doing in its iterations to solve the power flow problem. Keep it simple – remember you are only looking at the first two iterations for just one bus.

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6.41. Most power flow problems with even a few buses are very difficult to work by hand using Newton-Raphson. This is just a simple exercise to get to the first step (a Jacobian).

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