ECE 667 Homework 3
Due Thursday October 7, 2021

1.   Book 5.2

2.   Book 5.5 except changed so $X_d = 1.4$ and $X_q = 1.1$

3.   Repeat the Two-Axis, no saturation, example initial condition calculation from class (i.e., the one with the four bus system) except assume that the current into the infinite bus is $1.0\angle0°$ per unit. Give δ, V_d, V_q, I_d, I_q, E_q' and E_d'.

4.   Using the B4_GENSAL_SAT system presented in class, manually calculate the initial values for all the state variables and the field voltage if the real and reactive power output of the generator is changed so per unit power delivered to the infinite bus is $2 + j0.2$, and the saturation is changed so $S(1.0)=0.02$ and $S(1.2) = 0.1$. Also give the saturation function coefficients.

5.   Take the B4_GENHROU_SAT PowerWorld Simulator case and modify the initial fault so it is a self-clearing fault at Bus 1. Hence the system returns to its prefault conditions (assuming it is stable). Determine how the system damping and critical clearing time are affected by parameter changes in the most sensitive parameters at the Bus 4 generator. For this problem as a simple means of quantifying damping you can use the ratio of the generator 4 delta maximum positive deviation from its initial value on the fourth swing to its first swing value.

6.   Find a recent *IEEE Transactions on Power Systems* paper (not with Prof. Overbye as an author) on a topic associated with 667, and write a one page summary of the paper, including explaining why you think it is an important paper. This should be a minimum of 750 words.