PROBLEM SET #36

36.1 A 3-phase, 60Hz, 4-pole, Y-connected synchronous motor has the following parameters: $r_S = 12\Omega$, $X_S = 120\Omega$, and $L_{SF} = 0.9H$. The motor is connected to a balanced three-phase source that provides a line voltage of 208Vrms at 60Hz.

a. If (using the two wattmeter method) we determine that the source delivers +150W and +75VAR (both are three-phase), calculate the following:

   i. The source apparent power and the phase current (magnitude and angle)
   ii. The excitation voltage
   iii. The field current
   iv. The mechanical power out (Hint: subtract the losses in the stator resistance from the input power) and the efficiency

b. Repeat part a if the source now delivers +150W and -75VAR (both three phase). Note, this means that the source absorbs reactive power from the motor