

ECE 420  
Energy Systems II  
Homework #1

1. (1 points) Problem A-5 page 637 of the course textbook.
2. (2 points) A three phase 440V line-to-line source drives a 15 horsepower (1 hp = 746 W) motor at 90% efficiency and 80% power factor lagging. The 15 horsepower figure is the output mechanical power.
  - a. Find the current drawn by the motor
  - b. Find the real and reactive power drawn by the motor.
3. (2 points) Problem A-2 on page 636 of the course textbook.
4. (3 points) A three phase load draws 20kVA at 0.74 power factor lagging from a 440V line.
  - a. Determine the kVA<sub>r</sub> provided by a capacitor bank to raise the combined power factor to 0.92 lagging.
  - b. Determine the following three currents (amplitude and phase angle): current in phase a of the load, current in phase a of the capacitor bank, and current in phase a of the input line. Use line-to-neutral voltage of phase a as a zero reference for phase angle.
  - c. Draw a phasor diagram showing that the load and the capacitor currents sum to the line current. All three phases.
5. (2 points) Problem A-3(e) and (f) on page 636-637 of the course textbook.