

ECE370 POWER & ENERGY SYSTEMS

Homework Set 1

- 1.1 Given the complex numbers $\mathbf{A}_1 = 8 + j6$ and $\mathbf{A}_2 = 10/\underline{53.1}^0$ calculate the following, giving the answers in both rectangular and polar form.
- $\mathbf{A}_1 + \mathbf{A}_2$
 - $\mathbf{A}_1 \mathbf{A}_2$
 - $\mathbf{A}_1 / (\mathbf{A}_2)^*$
 - $(\mathbf{A}_2)^2$
 - $[100 + (\mathbf{A}_2)^2] / (\mathbf{A}_1)^*$
- 1.2
- A 12-pole generator is to be connected to a 50 Hz power grid. Compute the speed of its turbine.
 - An 8-pole generator is to be connected to a 60 Hz power grid. Compute the speed of its turbine.
- 1.3 An industrial plant consists of several induction motors. The plant's power factor is 0.6 lagging (rf = 0.8) and it absorbs 400 kVAR from the substation bus.
- Compute the required kVAR rating of the capacitor connected across the load to raise the pf to 0.9 lagging.
 - A 200 hp, 90% efficiency synchronous motor with a pf of 0.8 lead is connected to the same bus after the pf has been corrected. Calculate the resulting pf. (1 hp = 746 W).
- 1.4 Complete the Concept Quiz at the end of Chapter 1 in the course notes.