1. The following are questions from p 78 of the textbook. These could be good closed-book exam questions.
   a) 2.1. What types of connections are possible for three-phase generators and loads?
   b) 2.2. What is meant by the term “balanced” in a balanced three-phase system?
   c) 2.3. What is the relationship between phase and line voltages and currents for a wye (Y) connection?
   d) 2.4. What is the relationship between phase and line voltages and currents for a delta (Δ) connection?
   e) 2.5. What is phase sequence?
   f) 2.7. What is a Y-Δ transform?

2. Textbook 2-1. Three impedances of $4 + j3 \, \Omega$ are Δ-connected and tied to a three-phase 208-V power line. Find $I_L$, $P$, $Q$, $S$, and the power factor of this load.

3. A balanced three-phase 480-V source (three line-to-neutral voltages of 277 V) supplies a balanced three-phase inductive load. The load draws a total of 9 kW at a power factor of 0.9. Calculate the phase currents and the magnitude of the per-phase load impedances, assuming a Y-connected load. Draw a phasor diagram showing all three voltages and currents, assume $V_a$ is 0°.
   - In order to correct the power factor, three capacitors are connected in parallel with the load impedances. Find the value of the capacitors.

4. Repeat problem 3, assuming a delta-connected load.

5. The voltmeter shown measures 120 V. Let this voltage be the phase reference (0°). The phase impedance is $Z_φ = 5.2 + j2.7 = 5.86/27.44° \, \Omega$.
   a) What is $V_{AB}$ as a phasor?
   b) What would the ammeter measure?
   c) What is the apparent power?
   d) What is the real power?
   e) Correct the power factor with capacitors connected in a delta configuration, that is, find the value of the capacitors.

Answers
1. a) 2.1. Y & Δ
   b) 2.2. The 3 voltages are equal, the 3 currents are equal and the 3 loads are equal.
   c) 2.3. $V_φ = \frac{V_{LL}}{\sqrt{3}} = \frac{V_L}{\sqrt{3}}$
   d) 2.4. $V_φ = V_{LL} = V_L$
   e) 2.5. abc or acb
   f) 2.7. $Z_Y = \frac{Z_Δ}{3}$

2. a) 41.6 A
   b) 72.1 A
   c) 20.8 kW
   d) 15.6 kVAR
   e) 26.0 kVA

3. a) 12 Alagging by 25.8°
   b) 23 Ω
   c) 50.2 μF
   d) 208 V $e^{j30°}$
   e) 20.5 A
   f) 7.37 kVAR
   g) 6.54 kW
   h) 69.5 μF

5. a) 168 A
   b) 117 kVA
   c) 108 kW
   d) 51.541 °

ECE 3600 homework # 4