

ENEL 487

Practice Set 1

The following questions are based on the 5th edition of “Power System Analysis and Design” by Glover. From Chapter 2 of the book, please attempt the following problems:

Topic 1 (Basics)

- **2.1**
- **2.2:** The phasor magnitude should be the rms value of the sinusoid. Also, $\sin(\omega t + \theta) = \cos(\omega t + \theta - 90)$
- **2.4**
- **2.15 :** For part a, you need to write the sinusoidal expression for $v(t)$ and $i(t)$. Then multiply $v(t)$ and $i(t)$ to arrive at the expression for $p(t)$.

If you start with

$$p(t) = V_m I_m \cos(\omega t + \theta_v) \cdot \cos(\omega t + \theta_i)$$

and then use some trig sorcery, you will arrive at

$$p(t) = \frac{V_m I_m}{2} \cos(\theta_v - \theta_i) + \frac{V_m I_m}{2} \cos(2\omega t + \theta_v + \theta_i)$$

which is the equation used in the solution. You are not expected to remember any $p(t)$ expressions!

- **2.26:** For part a, calculate the real and reactive power for the line. The sum of this power and the power at the load should equal to the power at the sending end.
- **2.30:** Recall that $\mathbf{S} = \mathbf{VI}^*$ (bold font is used to indicate phasors.) Re-arranging this gives: $\mathbf{I} = \mathbf{S}^* / \mathbf{V}^*$

Topic 2 (Three Phase)

- **2.40:** Use V_{AN} as the reference phasor, i.e. set the phase angle for V_{AN} to zero.
- **2.42**
- **2.50**