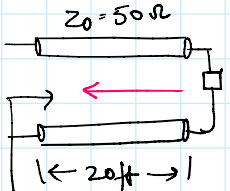
Smith Chart-5

Friday, May 22, 2020 8:21 AM

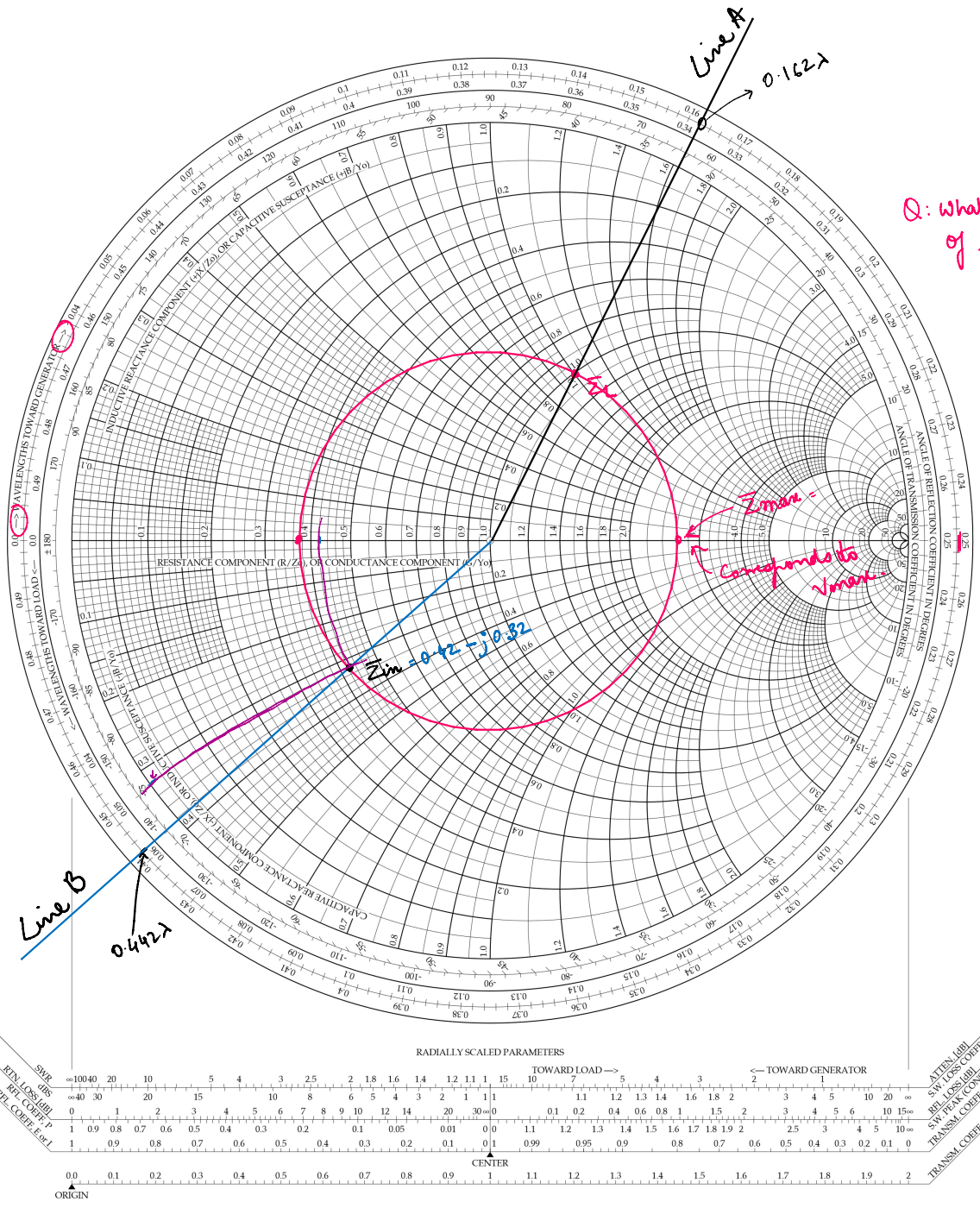
- HW #5 is due tomorrow
- Extra office hours – Monday – 1:30pm – 2:30pm

Example 4:



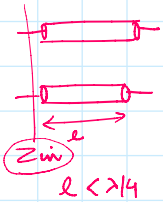
Q: Z_{in}?

Smith Chart



Q: What is the distance of first Vmax from the load?

$Z_{max} = \frac{V_{max}}{I_{min}}$



$l < \lambda/4$ capacitive

$\lambda/4 < l < \lambda/2$ inductive

Step 1: $\bar{Z}_L = \frac{50+j50}{50} = 1+j$ Mark on Smith Chart.

Step 2: Calculate the electrical length of the transmission line.

$$\text{length (metres)} = 20\text{ft} \times 0.304\frac{m}{ft} \approx 6.096m$$

$$\lambda = \frac{c}{f} = \frac{3\times10^8}{14.4\times10^6} = 21.276\,m$$

$$\text{length } (\lambda) = \frac{6.096m}{21.276m} \approx 0.28\lambda$$

Step 3: Find the starting point (in λ) on the Smith Chart $= 0.162\lambda$

Step 4: Go clockwise (Towards Generator) by 0.28λ

Final point (in λ) on the Smith Chart $= 0.442\lambda$

Step 5: Intersection of Line B & VSWR circle is $\bar{Z}_{in} = 0.42 - j0.32$

Step 6: $Z_{in} = 50(0.42 - j0.32)\ \Omega$

$Z_{in} = 21 - j16\ \Omega$