



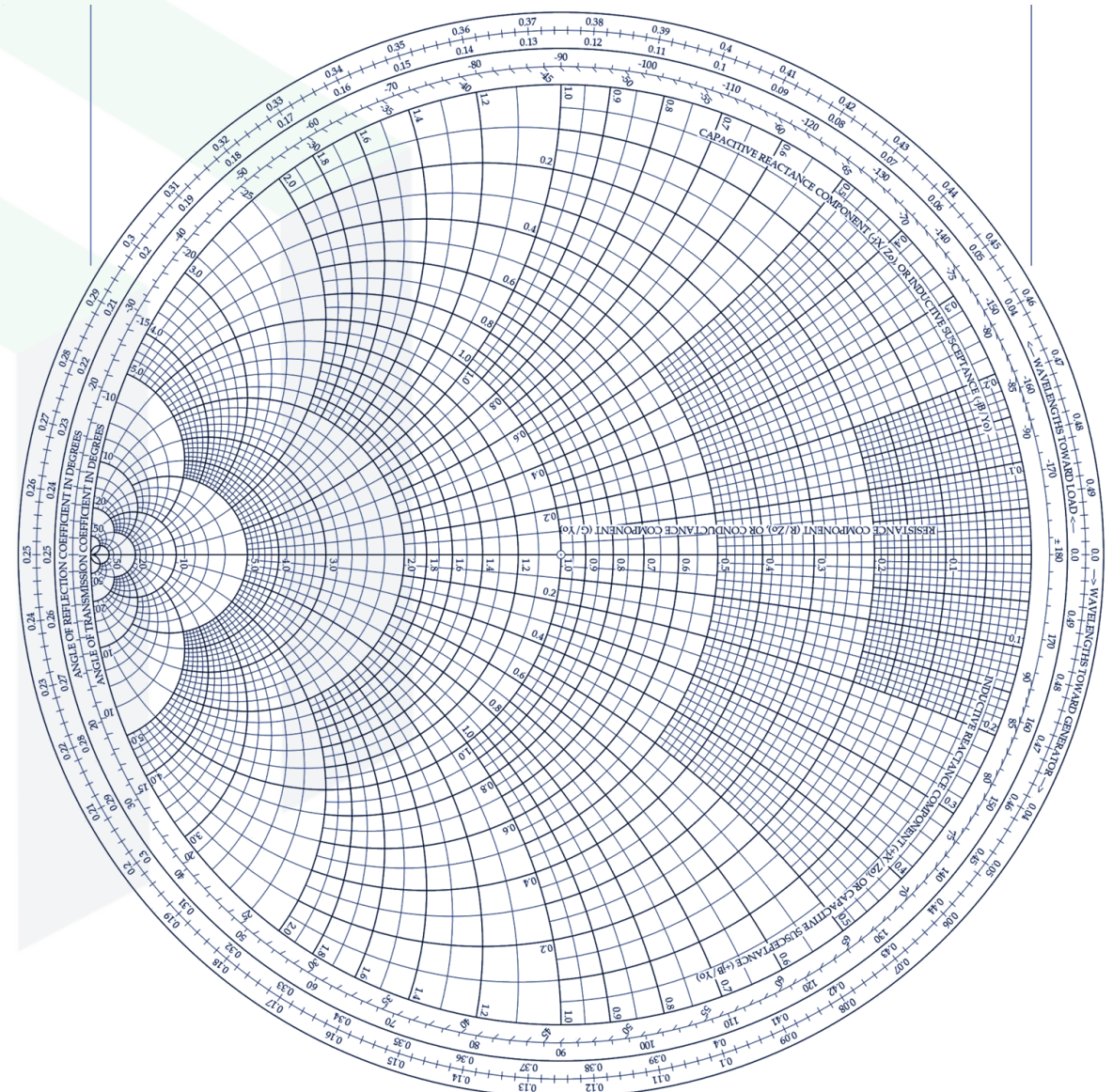
Electromagnetics:
Microwave Engineering

Impedance & Admittance
on Smith Charts

Admittance Coordinates

We could have derived the Smith chart in terms of admittance.

You can make an admittance Smith Chart by rotating the standard Smith chart by 180° .

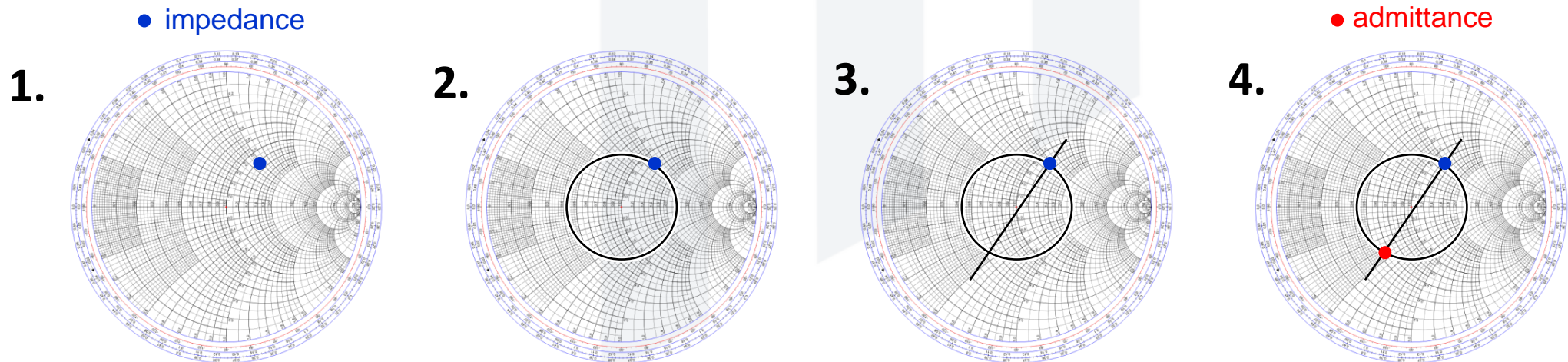


Impedance/Admittance Conversion

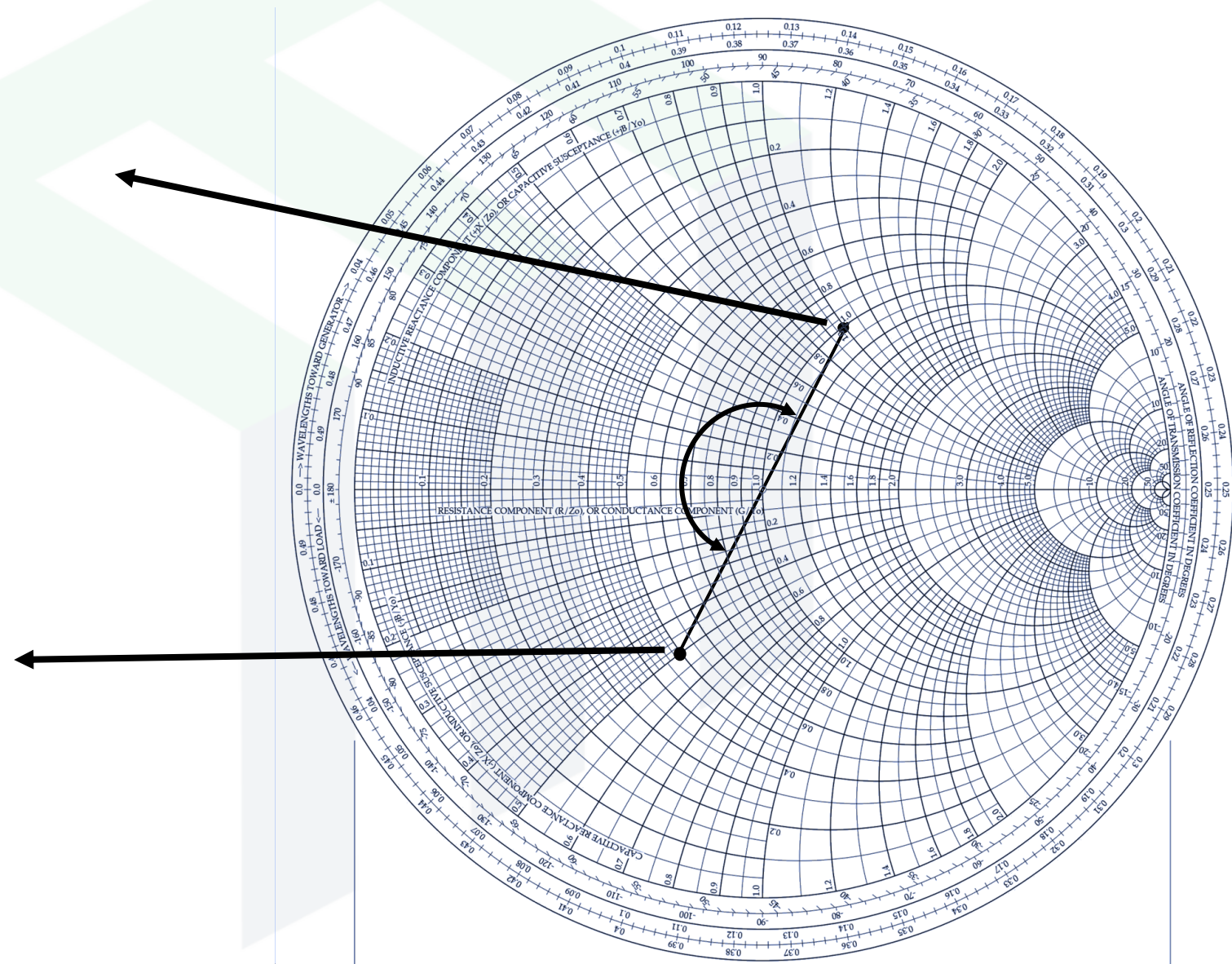
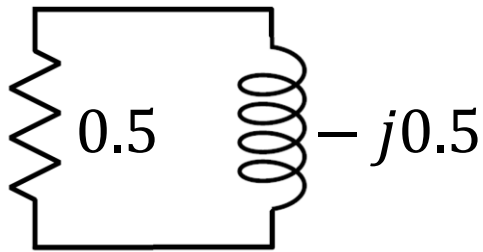
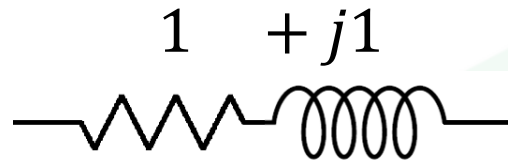
The Smith chart is just a plot of complex numbers. These could be admittance as well as impedance.

To determine admittance from impedance (or the other way around)...

1. Plot the impedance point on the Smith chart.
2. Draw a circle centered on the Smith chart that passes through the point (i.e. constant VSWR).
3. Draw a line from the impedance point, through the center, and to the other side of the circle.
4. The intersection at the other side is the admittance.



Visualizing Impedance/Admittance Conversion





Example 1

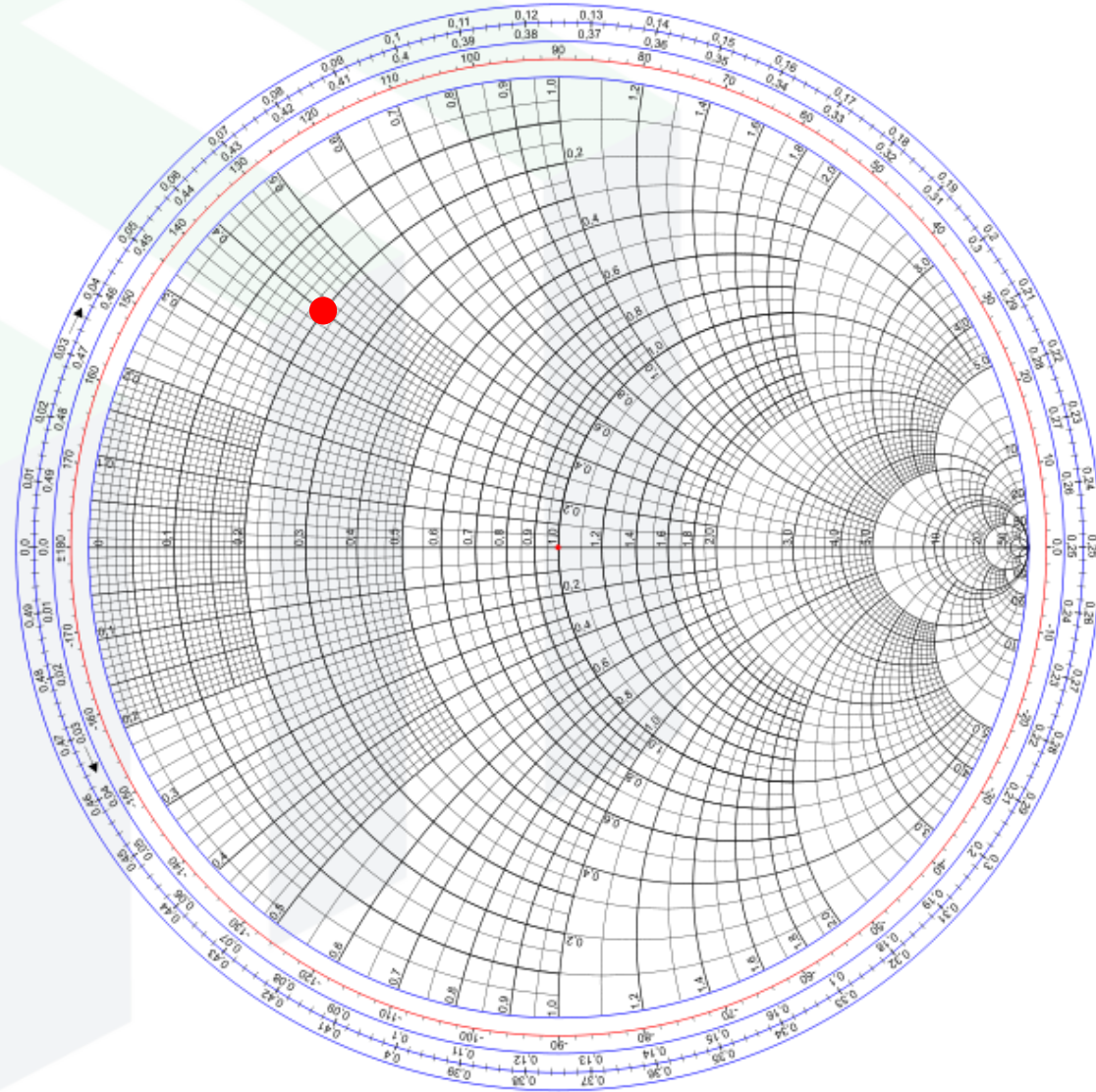
Example #1 – Problem Statement

Convert the normalized impedance $z = 0.2 + j0.4$ to normalized admittance y .

Example #1 – Step 1

Plot the impedance on the chart

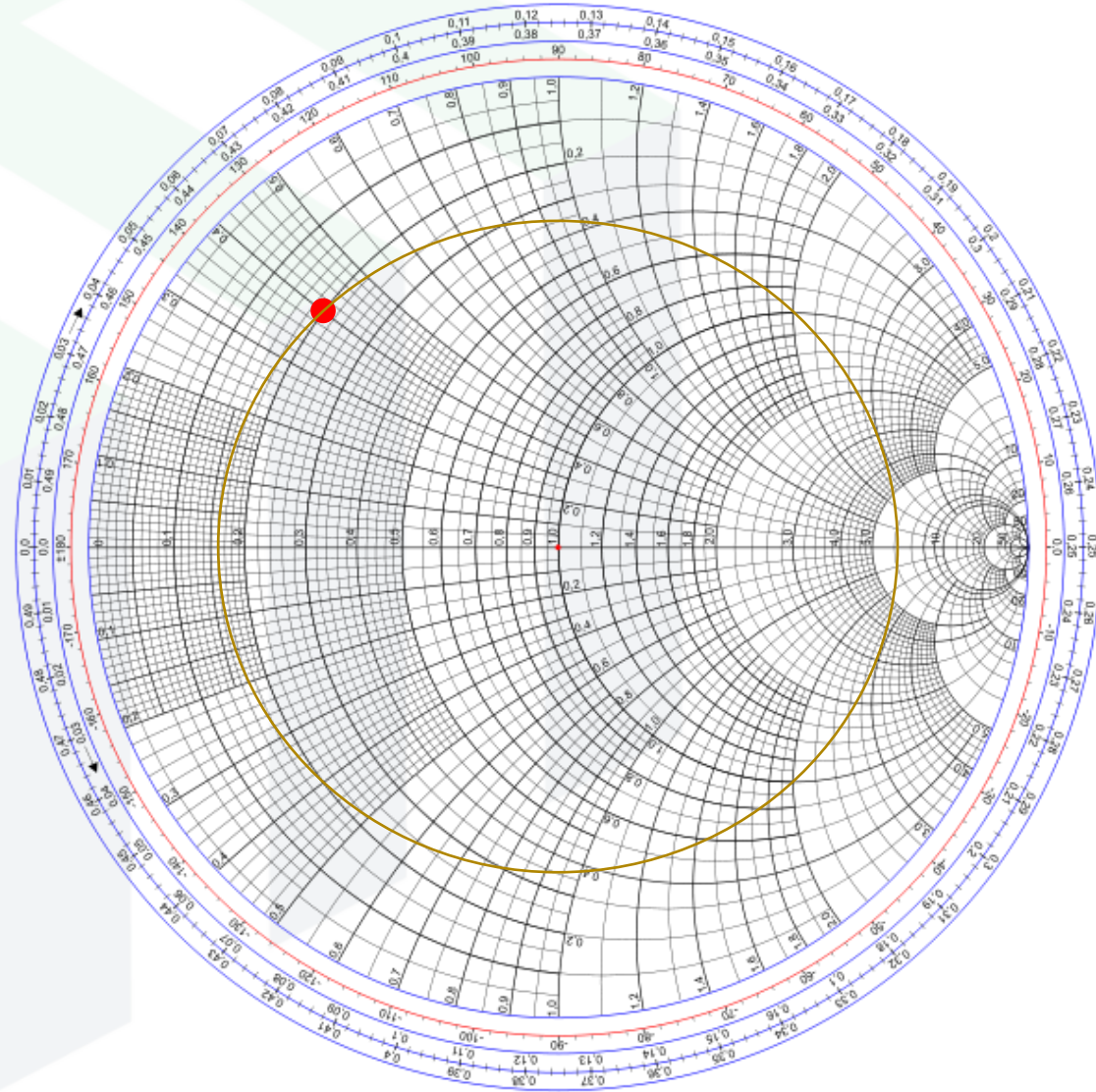
$$z = 0.2 + j0.4$$



Example #1 – Step 2

Draw a constant VSWR circle

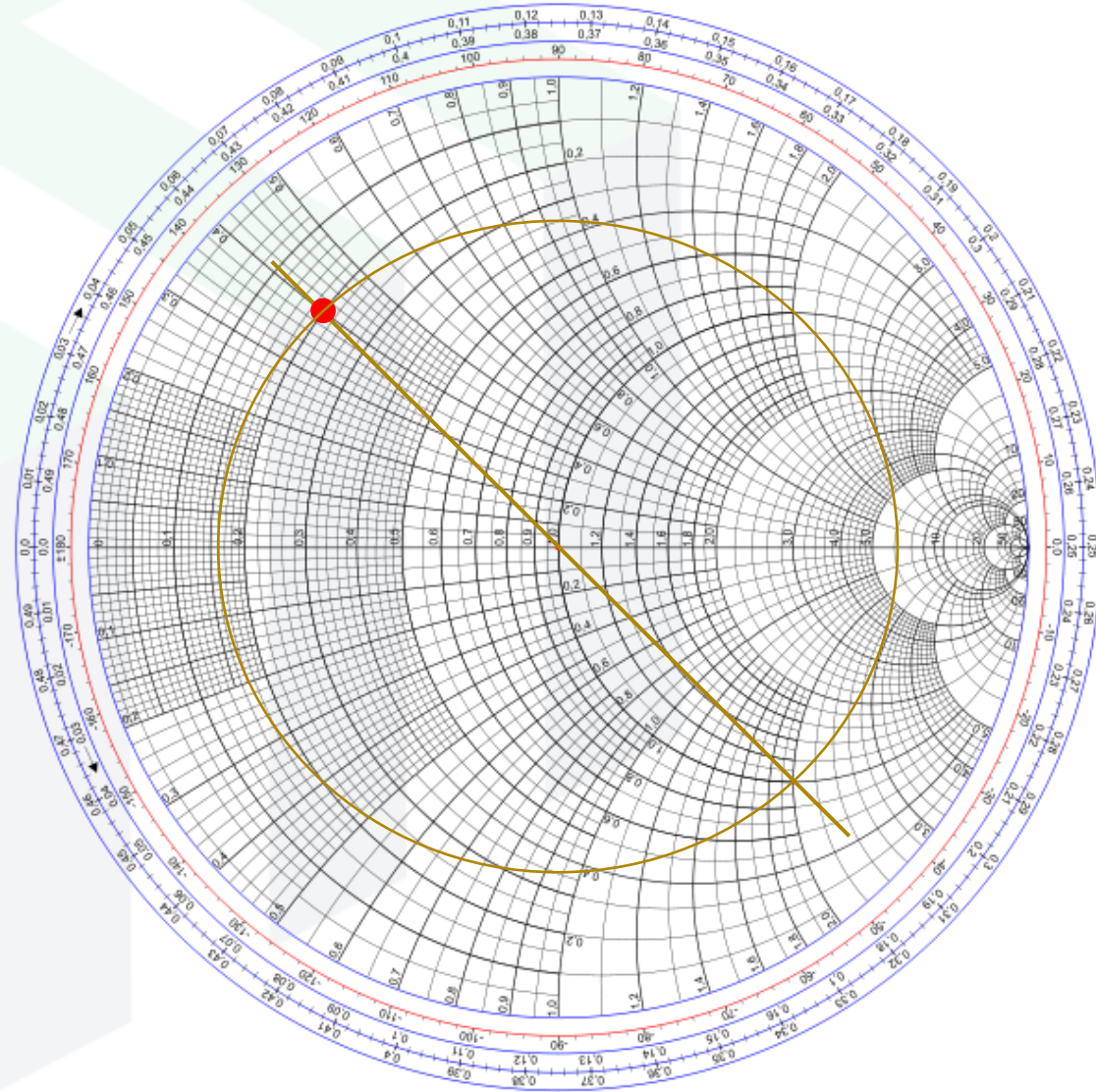
$$z = 0.2 + j0.4$$



Example #1 – Step 3

Draw line through center of chart

$$z = 0.2 + j0.4$$

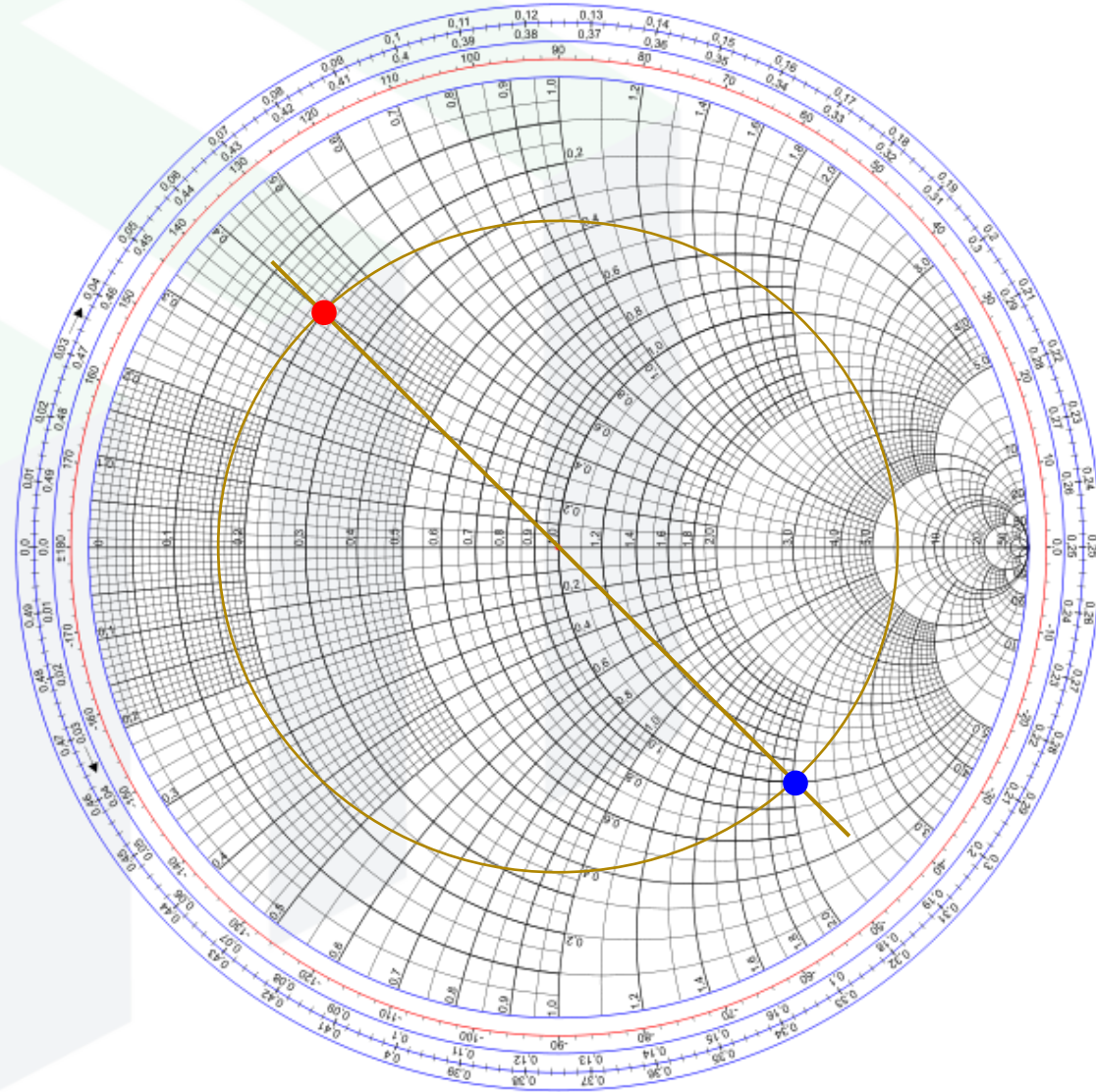


Example #1 – Step 4

Read off admittance

$$z = 0.2 + j0.4$$

$$y = 1.0 - j2.0$$





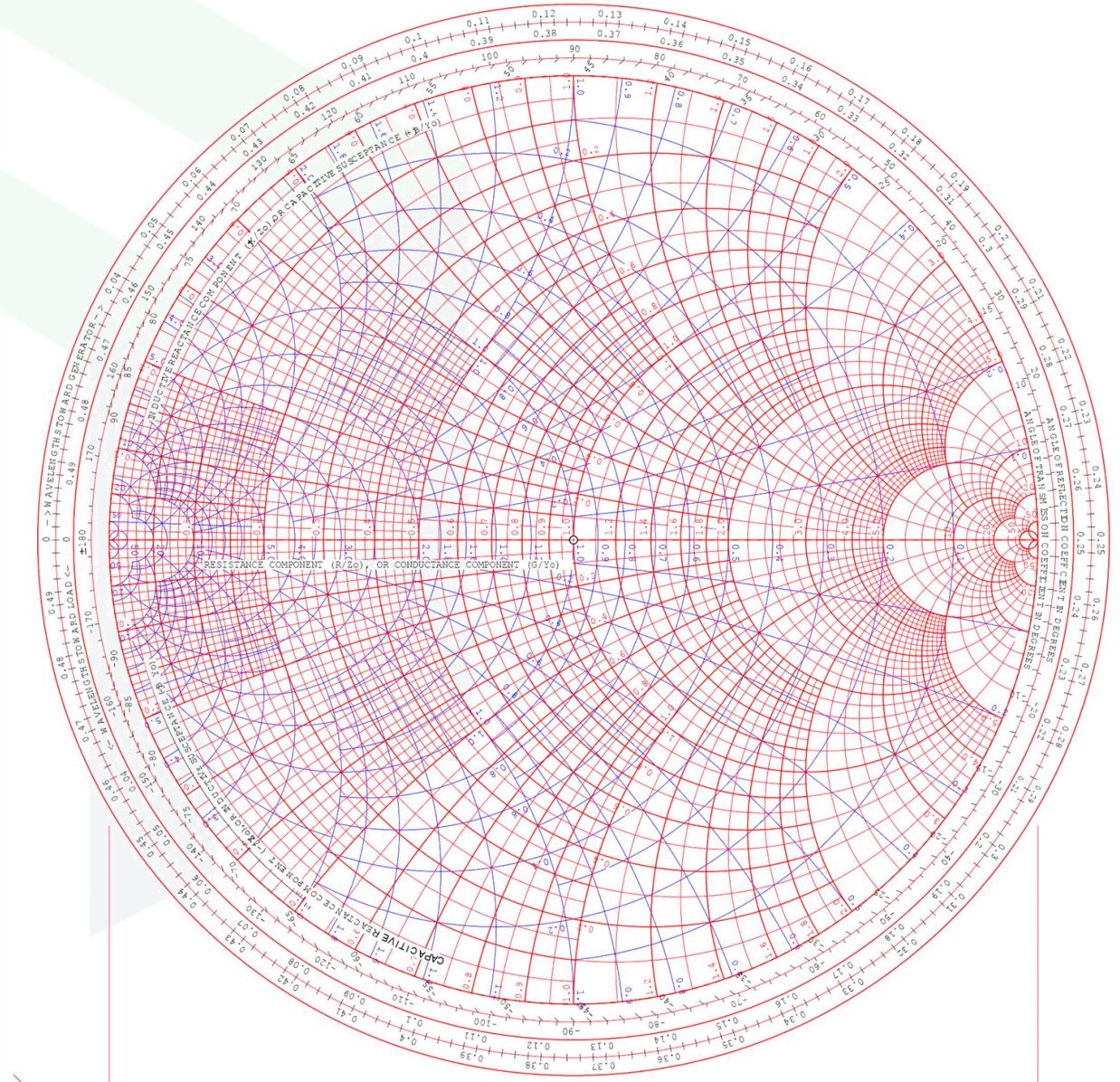
Example 2

Example #2 – Problem Statement

Convert the normalized impedance $z = 0.5 - j0.3$ to normalized admittance y using the combined impedance and admittance Smith Chart.

The Impedance and Admittance Smith Chart

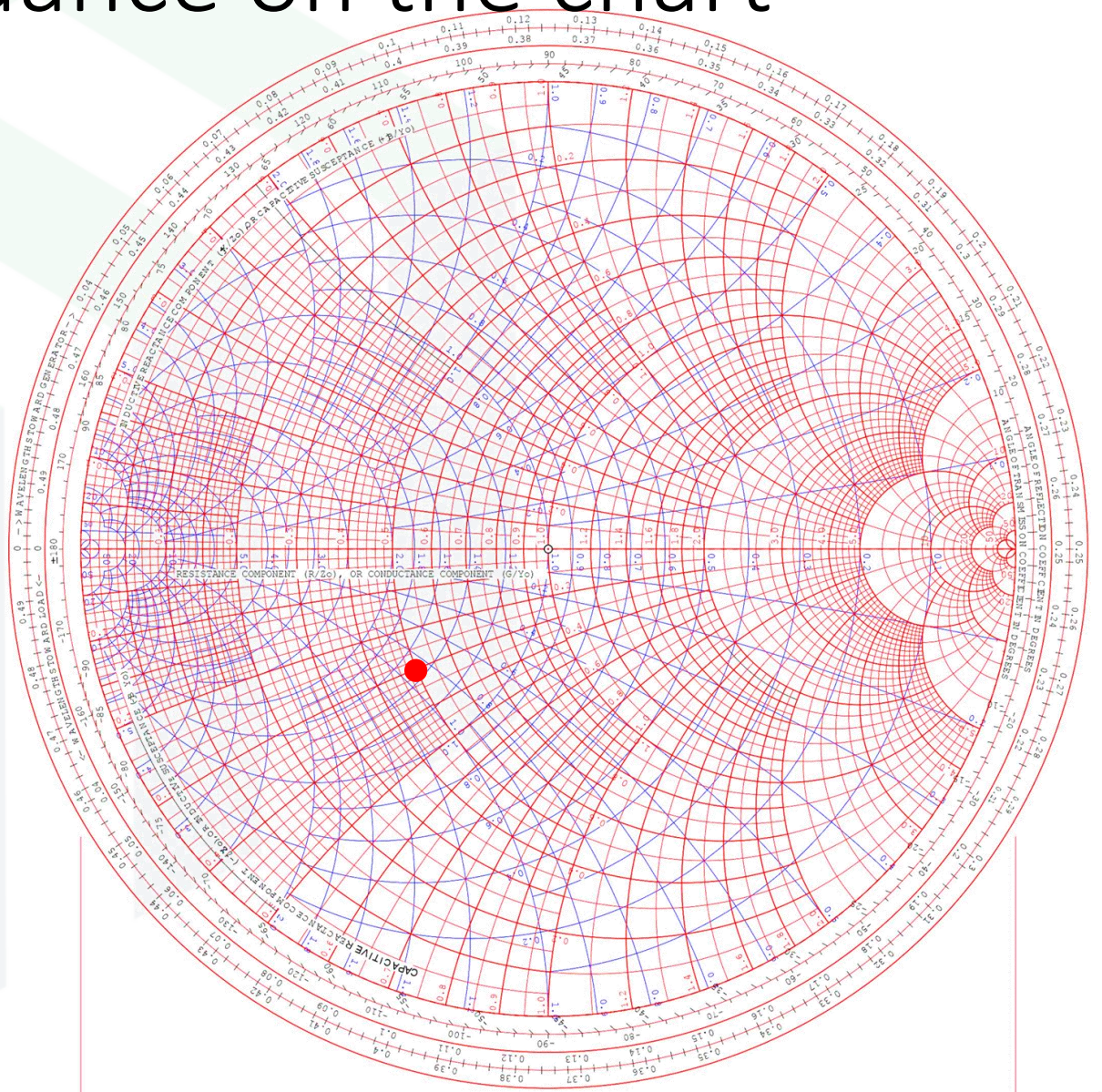
Red lines represent impedance, blue lines represent admittance



Example #2 – Step 1

Plot the impedance on the chart

$$z = 0.5 - j0.3$$



Example #2 – Step 2

Read off admittance

$$y \approx 1.5 + j0.9$$

