

Smith Chart Geography

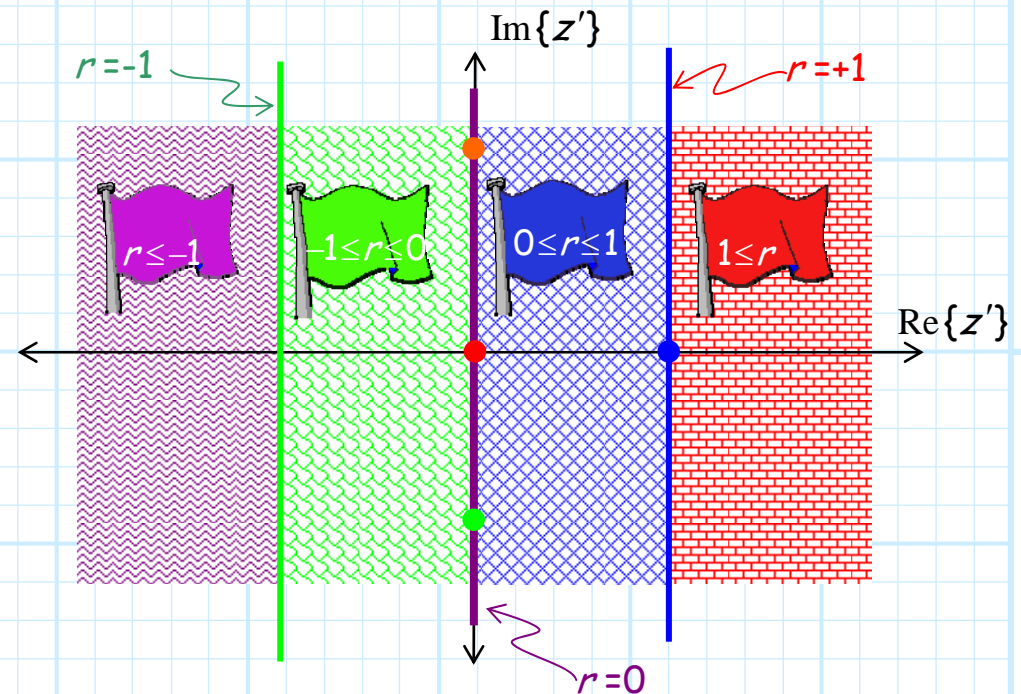
We have located specific **points** on the complex impedance plane, such as a **short circuit** or a **matched load**.

We've also identified **contours**, such as $r=1$ or $x=-2$.



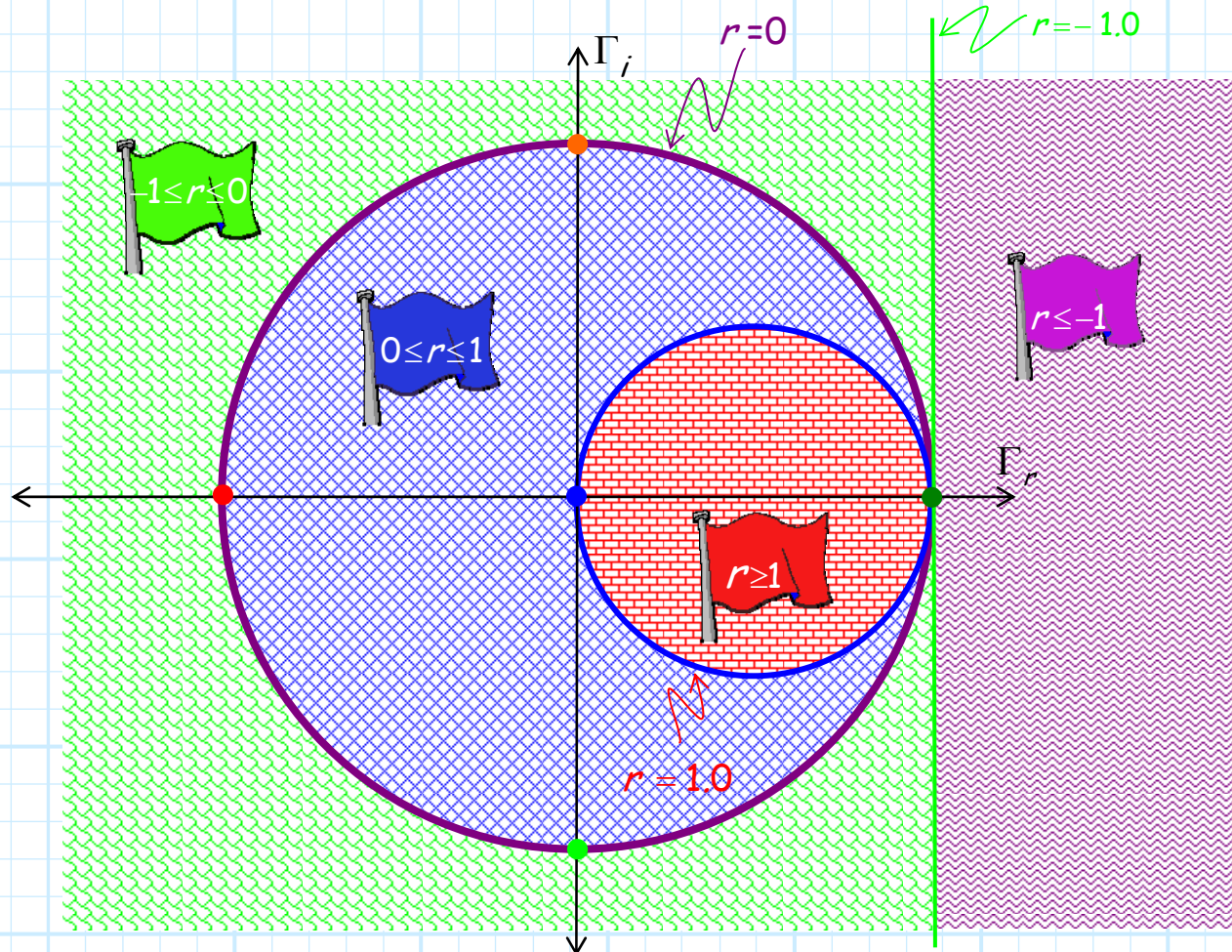
We can likewise identify **whole regions (!)** of the complex impedance plane, providing a bit of a **geography lesson** of the complex impedance plane.

For example, we can divide the complex impedance plane into **four** regions based on normalized **resistance** value r :



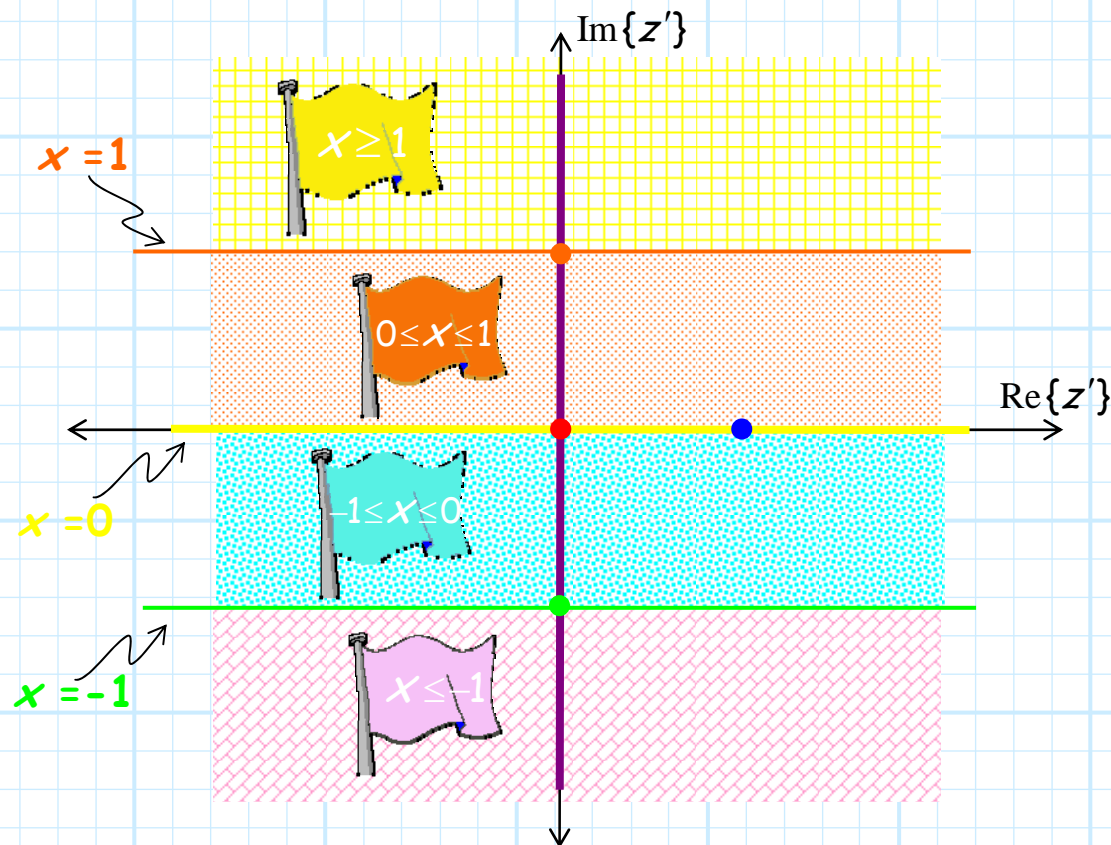
Mapping onto the Γ Plane

Just like points and contours, these regions of the complex impedance plane can be mapped onto the complex gamma plane!



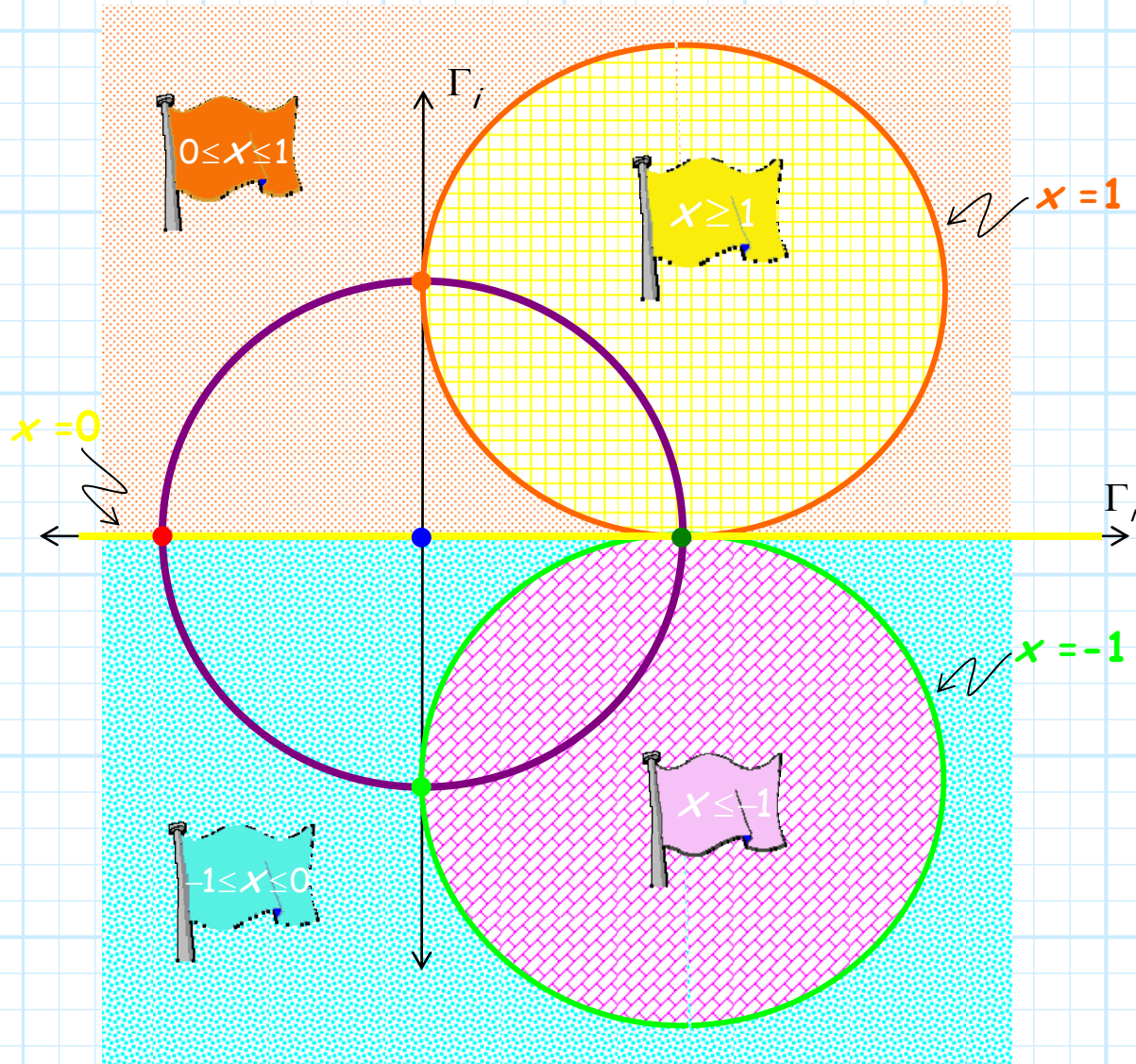
Reactive Boundaries and Borders

Instead of dividing the complex impedance plane into regions based on normalized resistance r , we could divide it based on **normalized reactance x** :



Mapping onto the Γ Plane

These four regions can likewise be mapped onto the complex gamma plane:



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Note the four resistance regions and the four reactance regions combine to form **16 separate regions** on the complex impedance and complex gamma planes!

Eight of these sixteen regions lie in the **valid region** (i.e., $r > 0$), while the other eight lie entirely in the invalid region.

Make sure **you** can locate the eight impedance regions on a **Smith Chart**—this understanding of **Smith Chart geography** will help you understand your design and analysis results!

