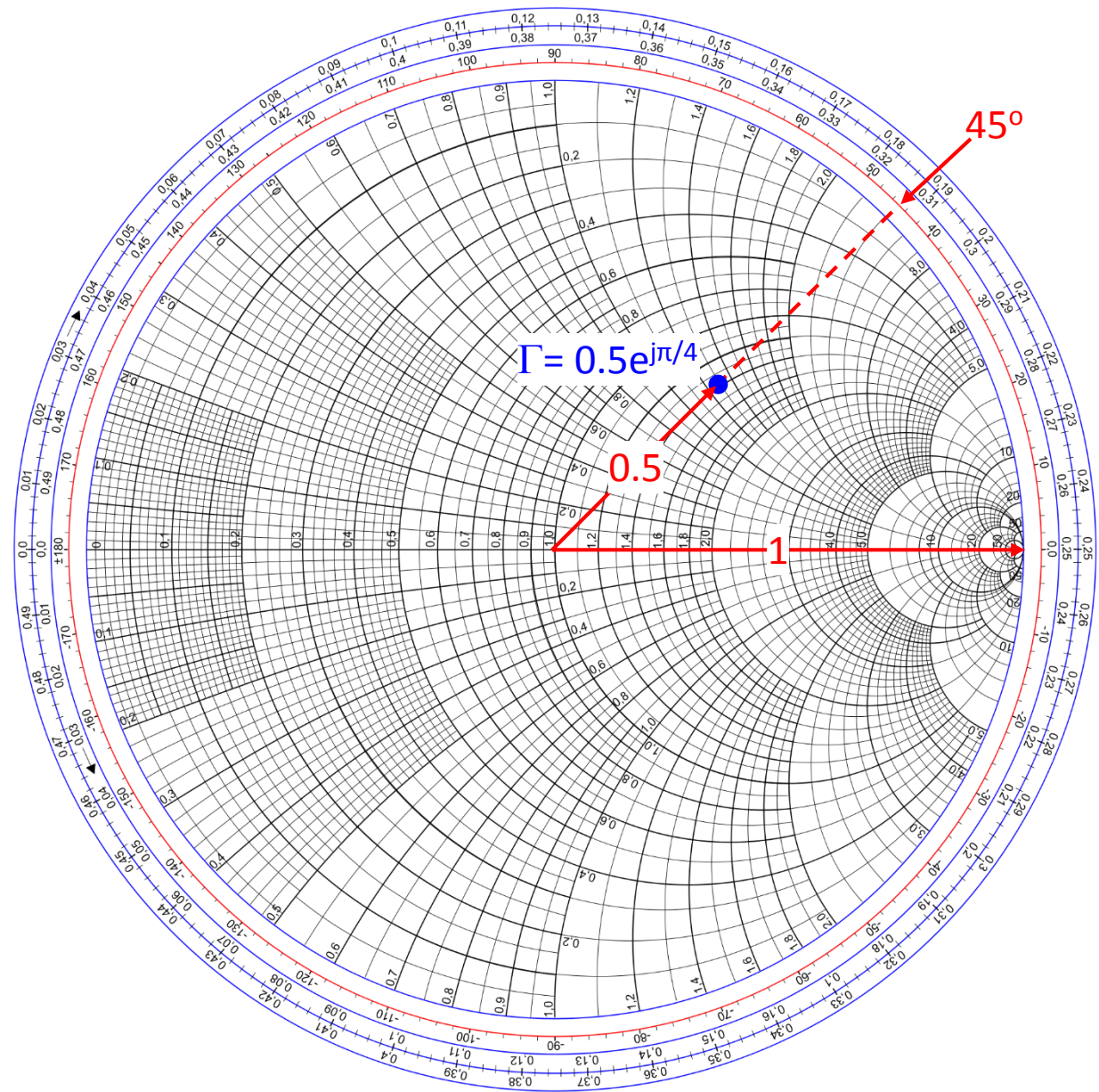# Smith Chart Tutorial
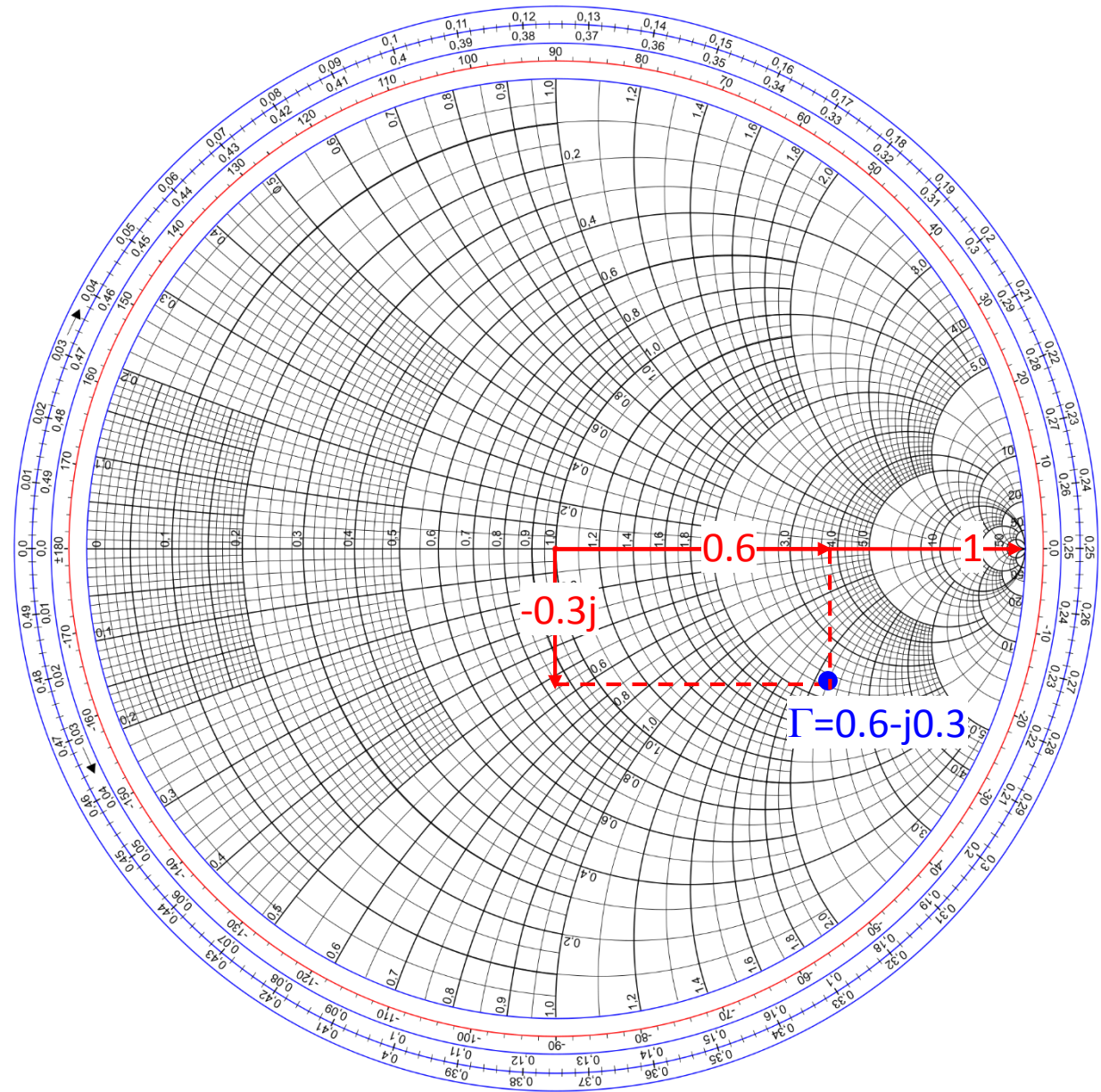
ECEN 3613 Electromagnetic Field

Daryoosh Vashaee, Oklahoma State University
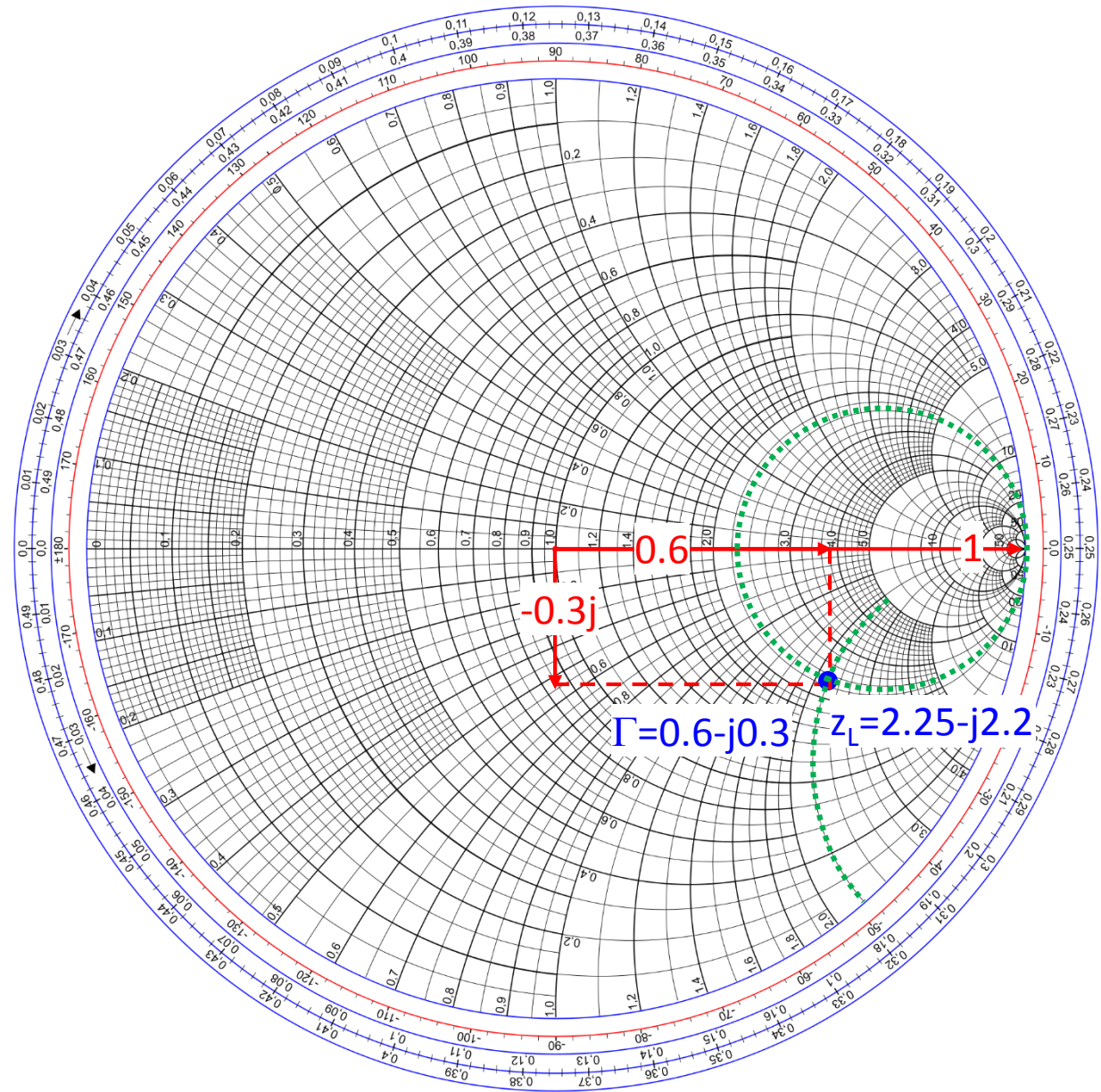
Find $\Gamma = 0.5e^{j\pi/4}$

Find Γ = 0.6-j0.3
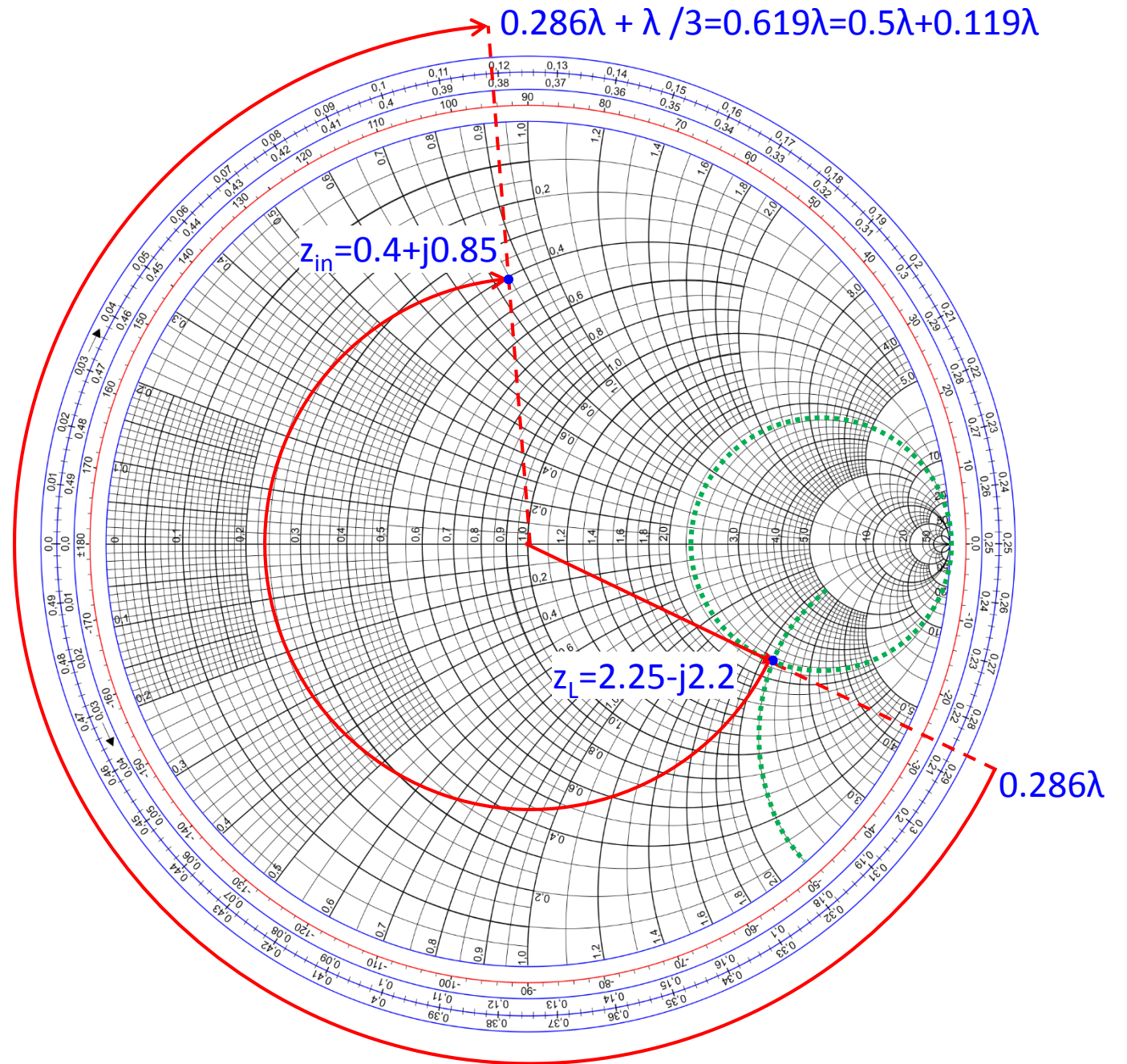
If the reflection coefficient at the load is $\Gamma = 0.6 - j0.3$, what is the normalized load impedance z_L?

0.6

-0.3j

1

$\Gamma = 0.6 - j0.3$

$z_L = 2.25 - j2.2$

What is the input impedance of a transmission line of length $\lambda/3$ terminated with a normalized load of $z_L=2.25-j2.2$?

$0.286\lambda + \lambda/3 = 0.619\lambda = 0.5\lambda + 0.119\lambda$

$z_{in}=0.4+j0.85$

$z_L=2.25-j2.2$

0.286λ

What is the SWR in a transmission line terminated with a normalized load of $z_L=2.25-j2.2$?

s=4.45

$z_L=2.25-j2.2$
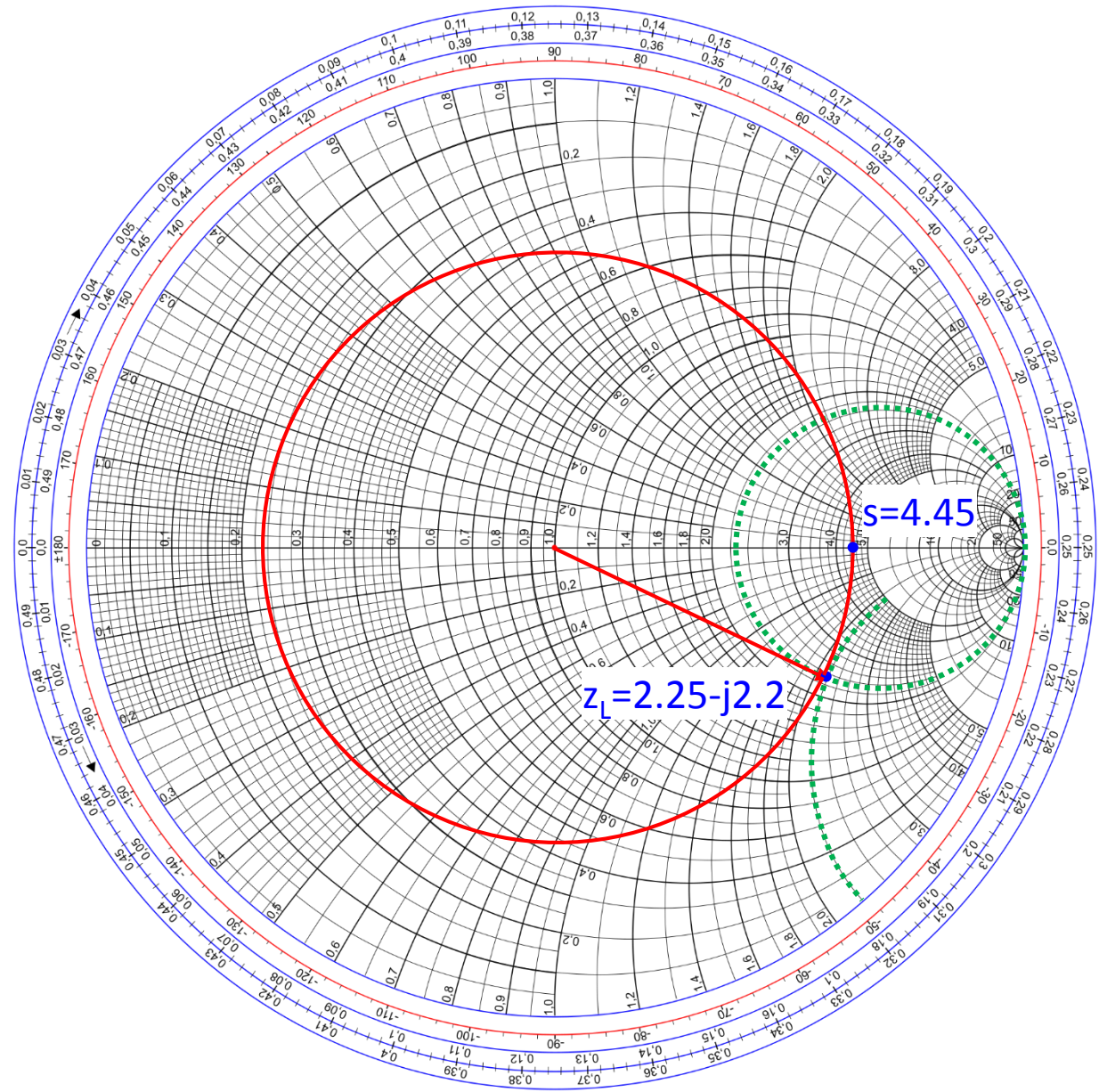
If the reflection coefficient at the load is $\Gamma=0.5e^{j135}$,

What is the reflection coefficient at distance of $\lambda/3$ away from the load?

0.064 λ

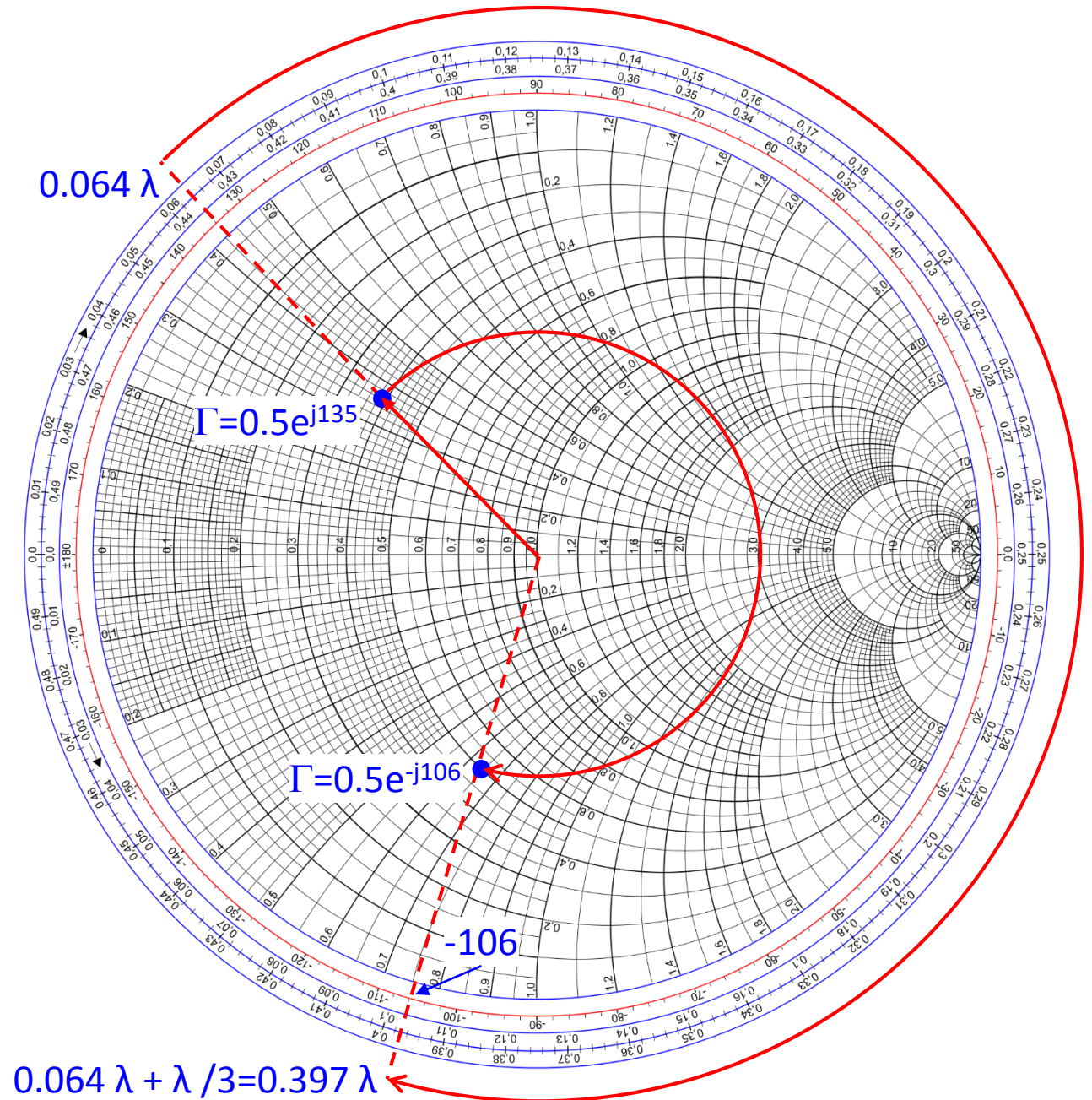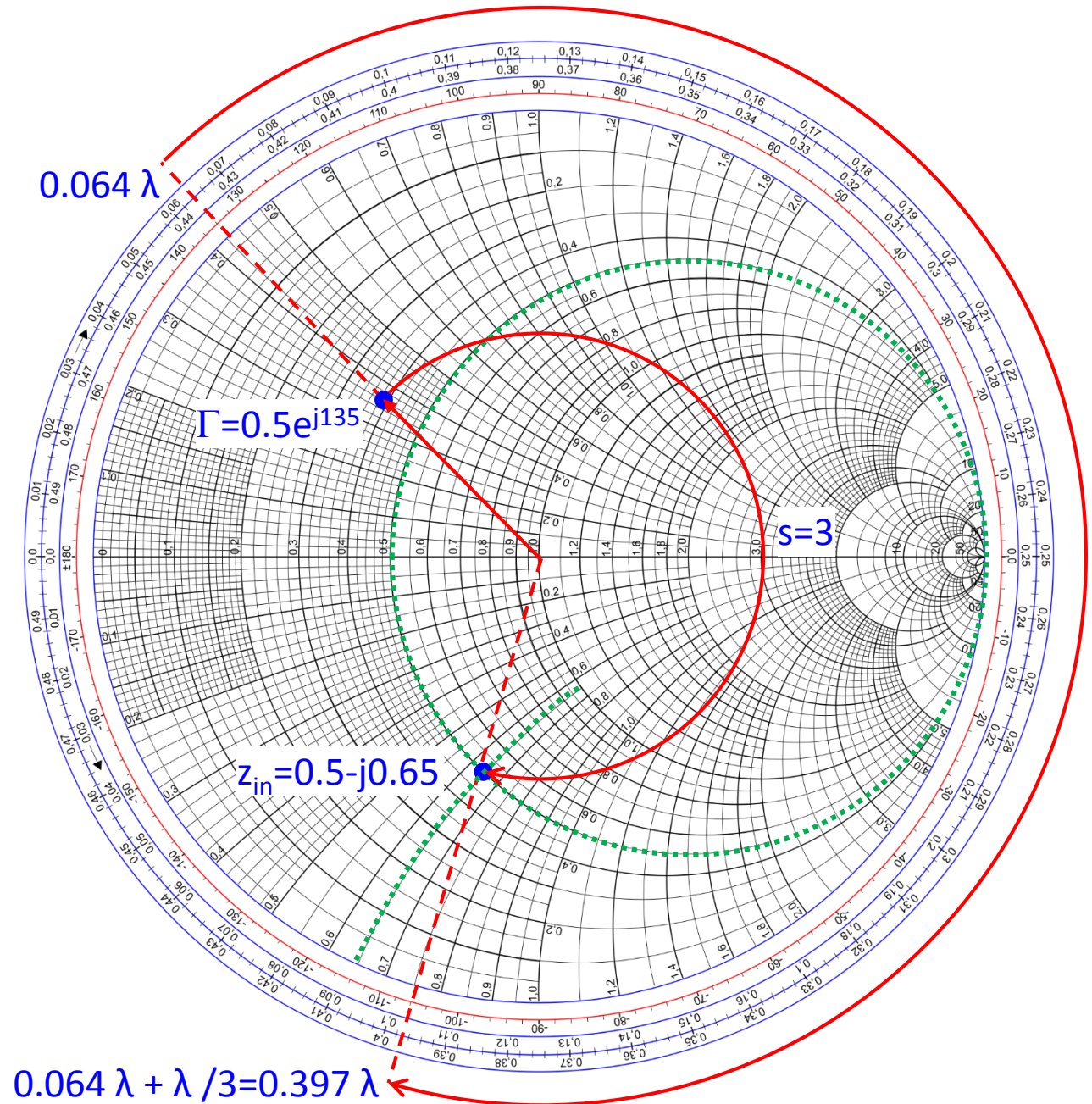$\Gamma=0.5e^{j135}$

$\Gamma=0.5e^{-j106}$

-106

0.064 λ + λ /3=0.397 λ

If the reflection coefficient at the load is $\Gamma = 0.5e^{j135}$:

What is the input impedance at distance of $\lambda/3$ away from the load?

What is SWR?

0.064 λ

$\Gamma = 0.5e^{j135}$

s=3

$z_{in} = 0.5 - j0.65$

0.064 λ + λ/3 = 0.397 λ

If the reflection coefficient at the load is $\Gamma=0.5e^{j135}$, at what distance from the load the voltage is <u>maximum</u>? What is the value of Γ as this point?

Note: This location is also where the current is <u>minimum</u>.

0.064 λ

$\Gamma=0.5e^{j135}$

$\Gamma=0.5$

L=0.25λ-0.064 λ = 0.186 λ

If the reflection coefficient at the load is $\Gamma = 0.5 e^{j135}$, at what distance from the load the voltage is <u>minimum</u>? What is the value of Γ as this point?
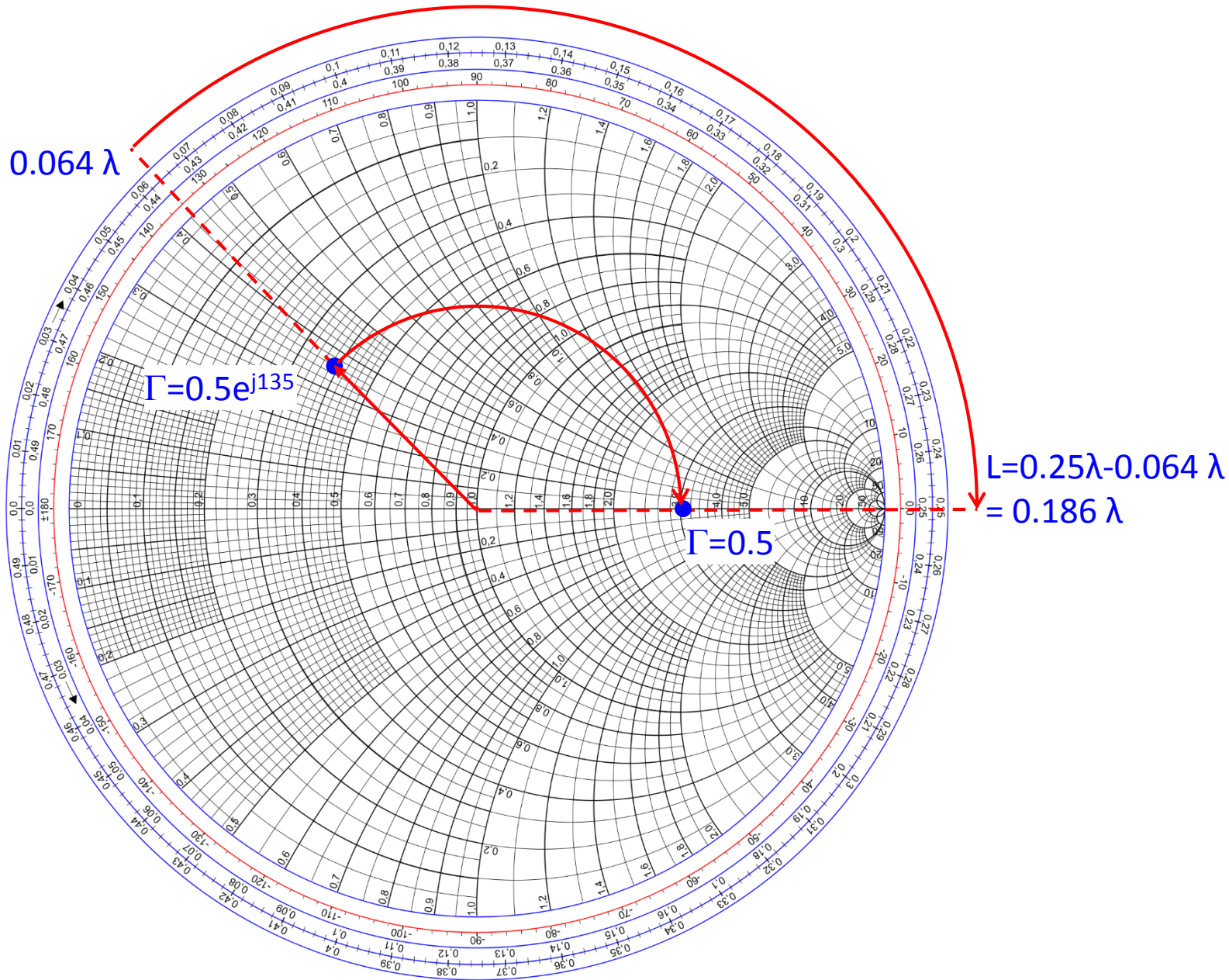
Note: This location is also where the current is <u>maximum</u>.

0.064

$\Gamma = 0.5 e^{j135}$

$L = 0.5\lambda - 0.064\,\lambda = 0.436\,\lambda$

$\Gamma = -0.5$