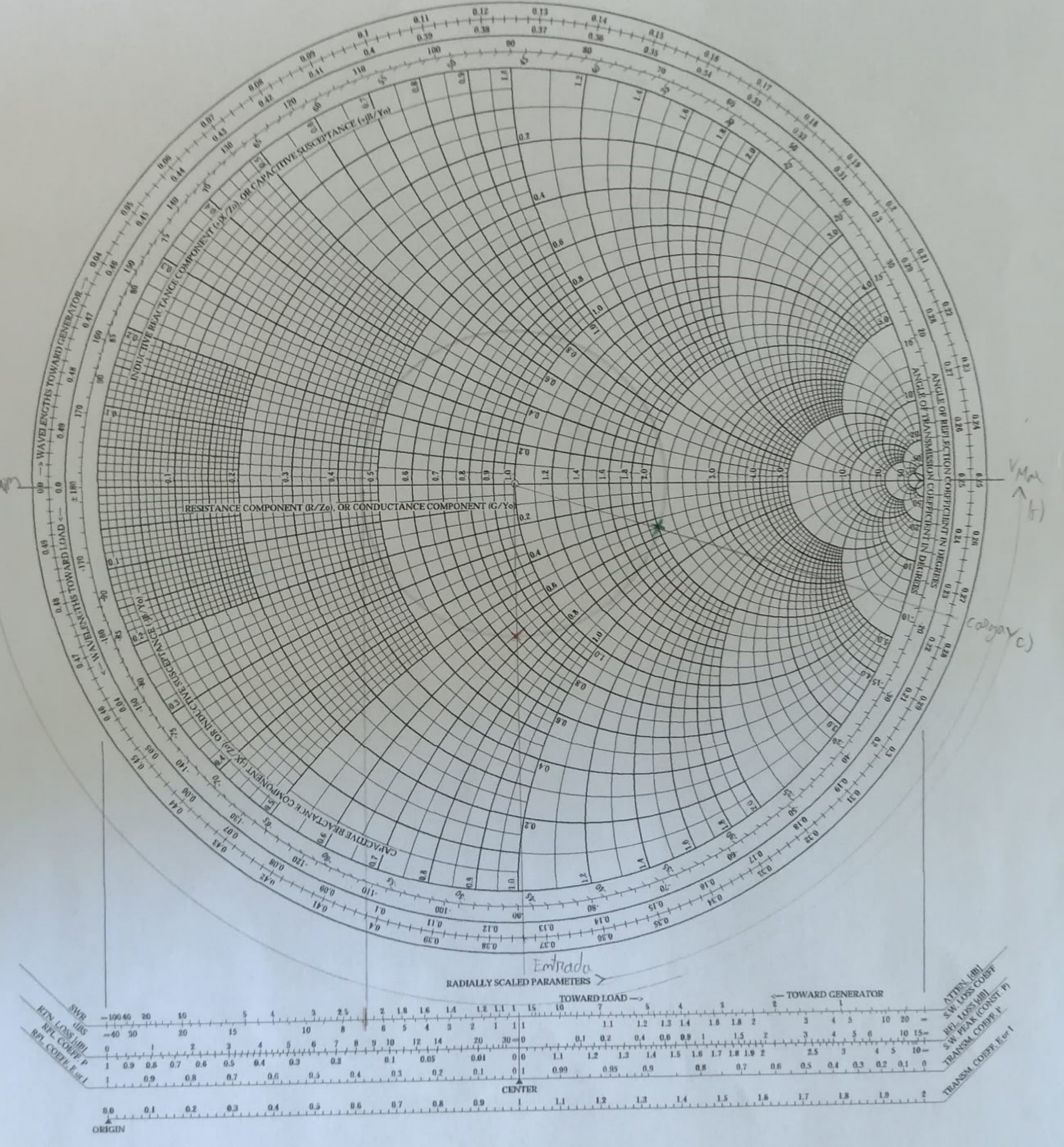
1) a) $0{,}75 - j0.65$

b) $0{,}374 - 0{,}25 \rightarrow 0{,}124\lambda$

c) $0{,}5 - 0{,}274 \rightarrow 0{,}226\lambda$

d) 2.2

The Complete Smith Chart



a) $Z_0 = 50\,\Omega$ $Z_L = 23 - j48\,\Omega \Rightarrow z_L = 0.46 - 0.96j$

a) $0.62\angle -88^\circ = K_V$

$4.4 = SWR$

b) $0.5 - (0.25 - 0.128) = 0.378\lambda \rightarrow 0.945m$

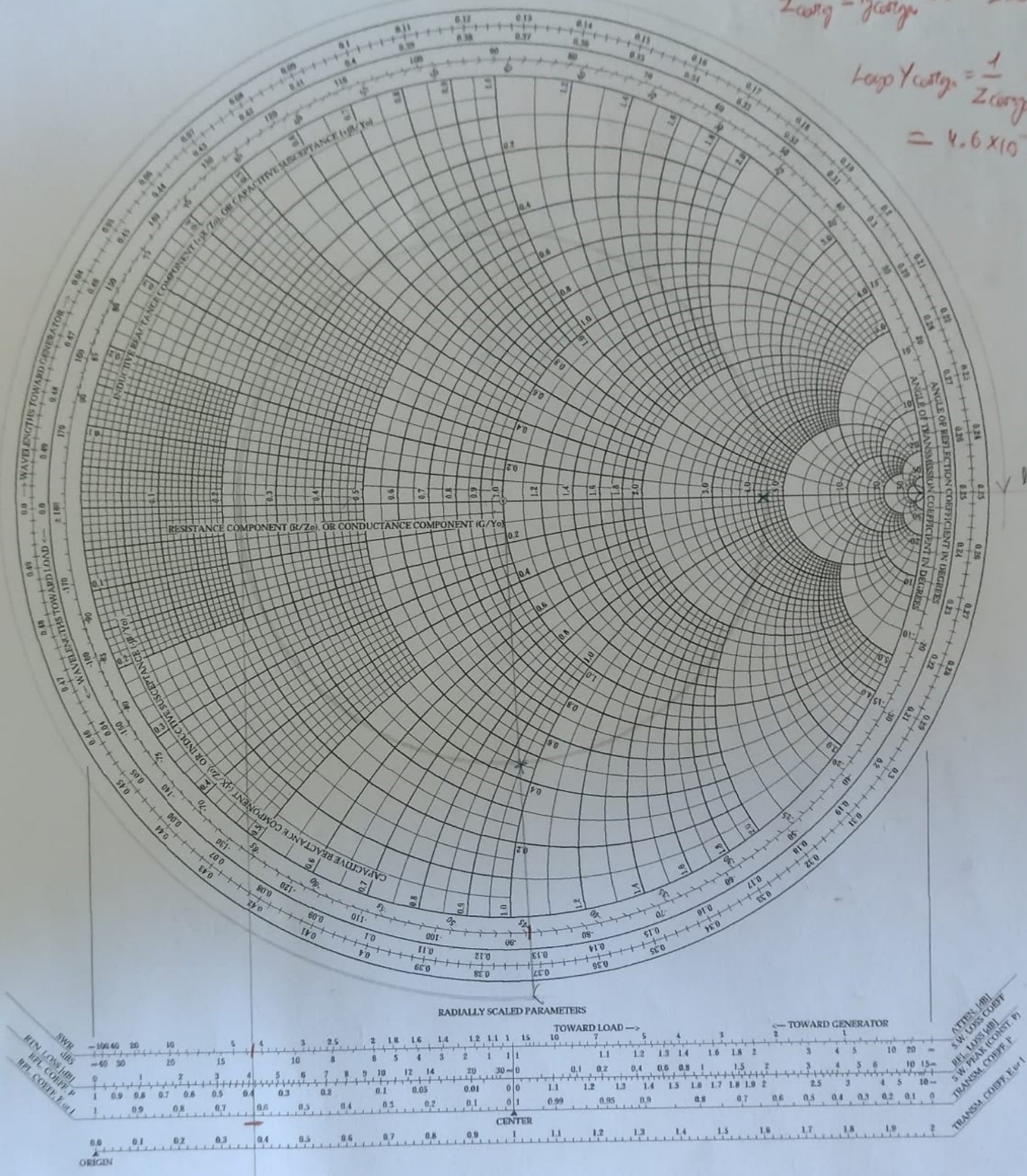
The Complete Smith Chart

c) $l = 3.45m \rightarrow 1.38\lambda \Rightarrow Z_{carga}$ no será real positivo $\Rightarrow Z_{carga} = SWR = 4.4\,\Omega$

$Z_{carg} = z_{carga} \times 50 = 220\,\Omega$

$Log\, Y_{carga} = \frac{1}{Z_{carga}} =$

$= 4.6 \times 10^{-3}\,\Omega^{-1}$



3) $Z_0 = 50\,\Omega$

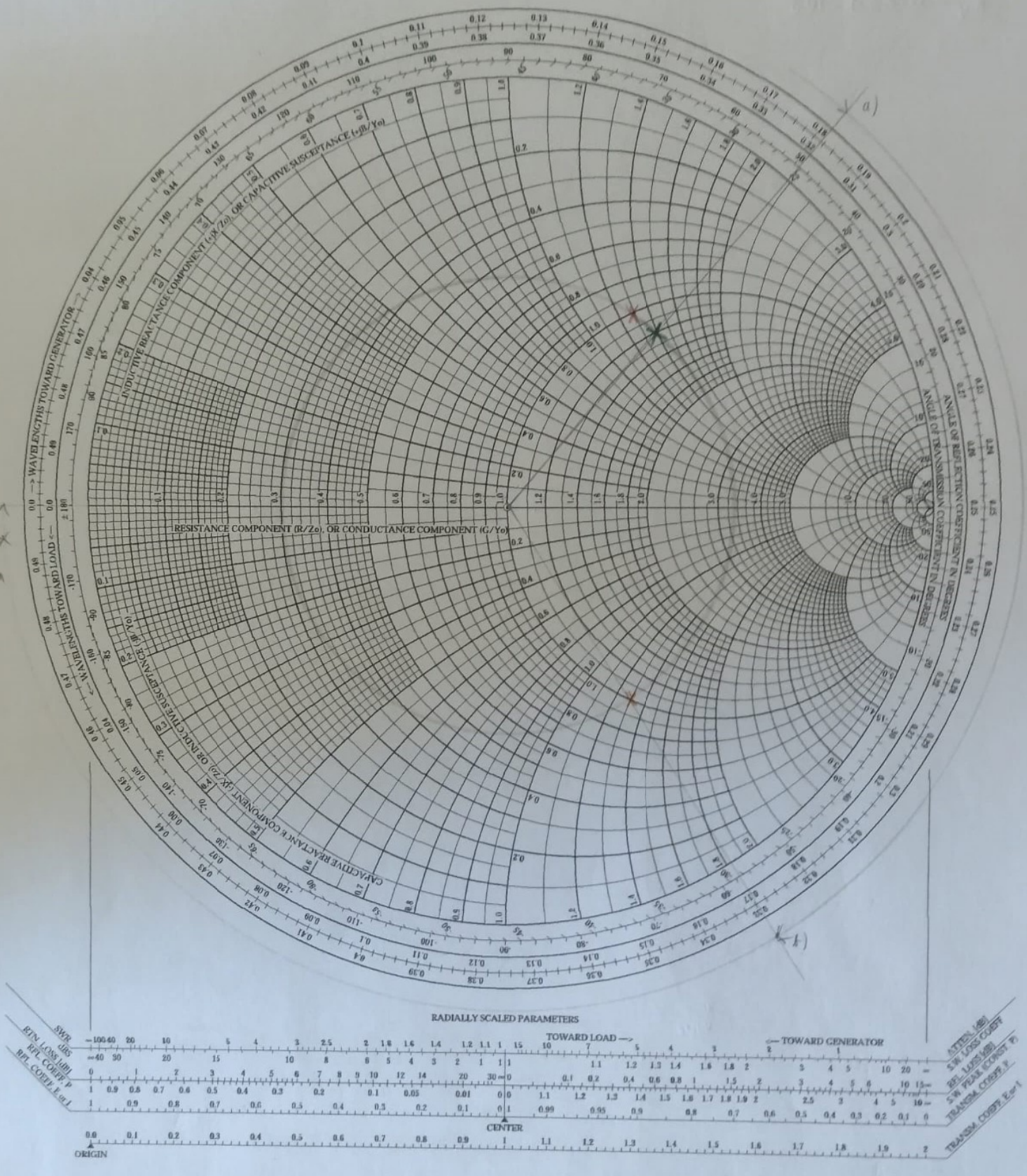
$y_L = 1.2 + j1.4$

a) $0.5 - (0.182) = 0.318\lambda \Rightarrow 25.44\,cm$

b) $0.33 - 0.182 = 0.148\lambda \Rightarrow 11.84\,cm$

The Complete Smith Chart

Uso como carta de adaptamos!



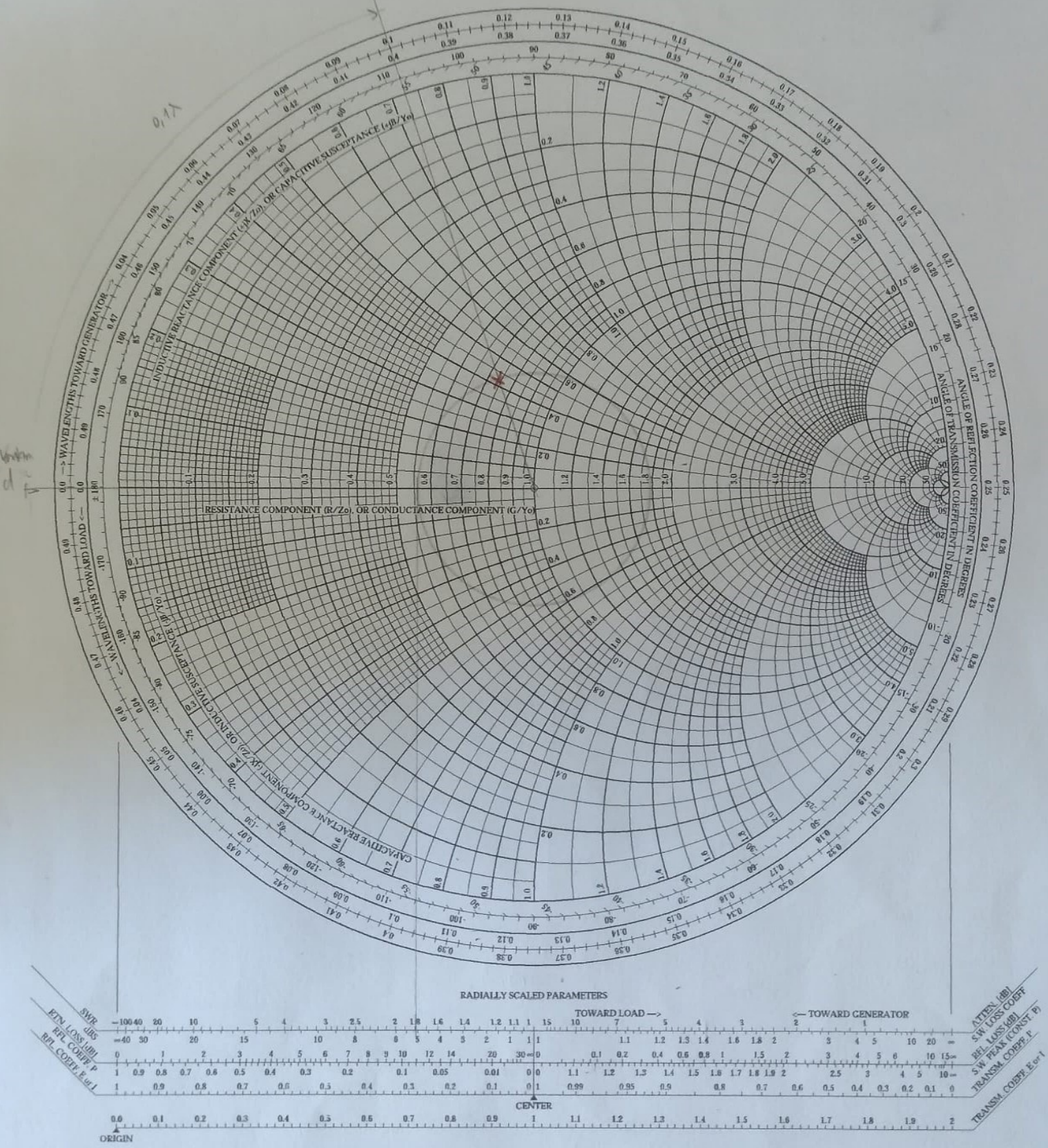
4) SWR = 1.8

$Z_0 = 50$

$\lambda = 80\,cm$

$Z_L = 0{,}74 + 0{,}44j$

The Complete Smith Chart



5) a) $27-12=15=\frac{\lambda}{2} \Rightarrow \lambda = 30\,cm$

b) $c \Rightarrow \lambda f \Leftrightarrow f = \frac{c}{\lambda} = 10\times10^{9}\,Hz \Rightarrow 10\,GHz$

c) $SWR = \frac{0,72}{0,4} = 1,8$

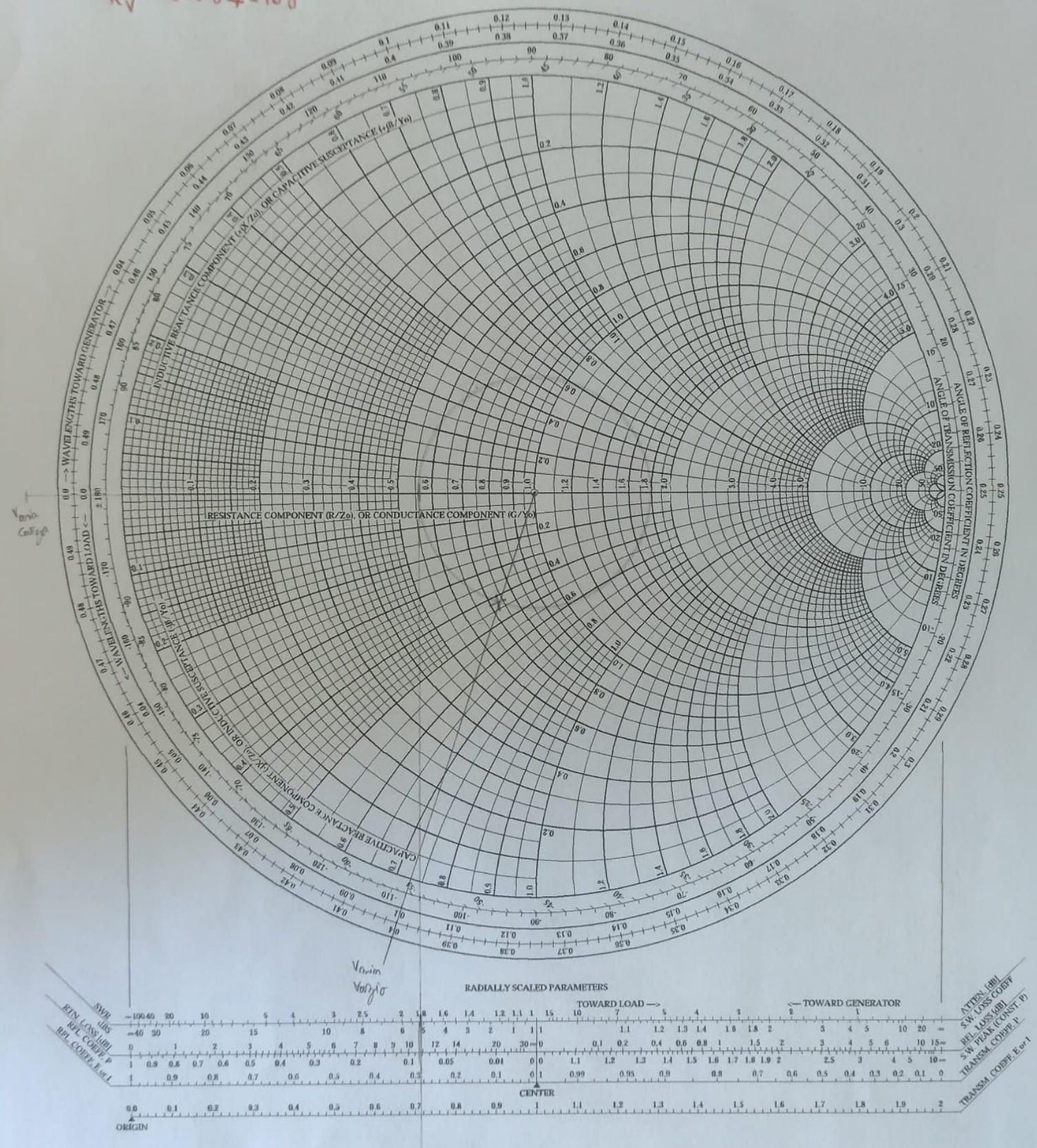
d) $0,725 - j0,42$

carga - 9 cm $\rightarrow 0,3\lambda$

cc - 12 cm $\rightarrow 0,4\lambda \rightarrow 0,1\lambda$

The Complete Smith Chart

$K_V = 0.28 \angle -108^{\circ}$



6) a) $c = f\lambda \Leftrightarrow \lambda = \frac{\frac{2}{3}c_0}{f} = 20\,m$

$b_1 = 1.6$

b) $z_L = 2 + j2$ (x)

$y_L = \frac{1}{4} - \frac{1}{4}j$ (•)

$l_1 = 0.22\lambda$ ou $l_2 = 0.362\lambda$ $\Rightarrow$ $b_{stub_1} = -b_1 \Leftrightarrow \text{cotang}(\beta l_{st_1}) = b_1 \Leftrightarrow l_{st_1} = 0.089\lambda$

$b_{stub_2} = -b_2 \Leftrightarrow \text{cotang}(\beta l_{st_2}) = b_2 \Leftrightarrow l_{st_2} = 0.411\lambda$

The Complete Smith Chart

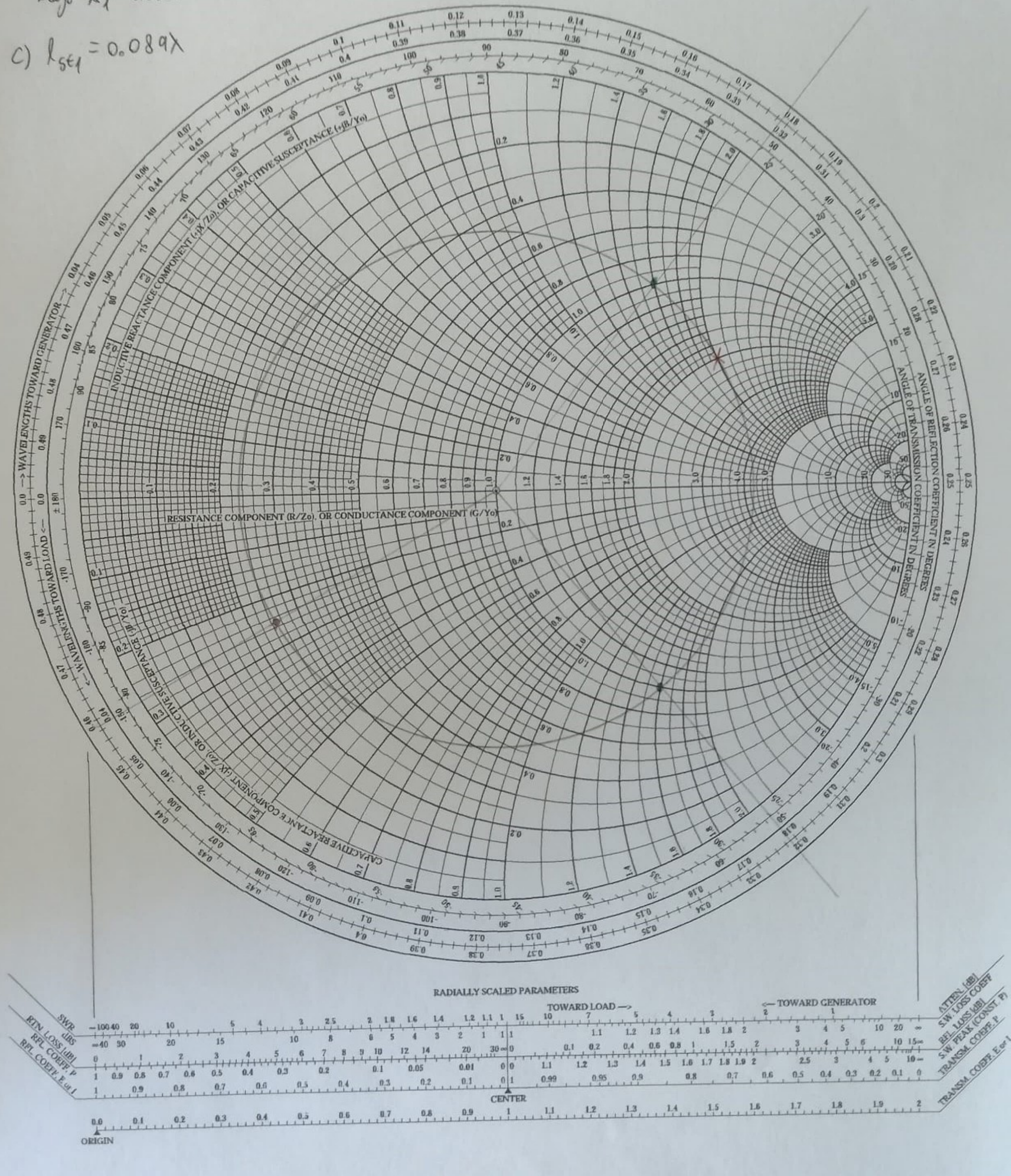
$b_2 = -1.6$

$\text{Re}\{y'_{in}\} = 1$

Menor l_{st} => opção 1

Logo $l_1 = 0.22\lambda$

c) $l_{st_1} = 0.089\lambda$



A) $\lambda = 1$

$z_L = 1.2 - 1.6j$ (x)

$y_L = 0.3 + 0.4j$ (o)

a) $l_1 = 0.111\lambda \Rightarrow b_1 = 1.5 \Rightarrow b_{st1} = -b_1 \iff \text{cotang}(B l_{st1}) = b_1 \iff l_{st1} = 0.094\lambda$

$l_2 = 0.259\lambda \Rightarrow b_2 = -1.5$ → $b_{st2} = -b_2 \iff \text{cotang}(B l_{st2}) = b_2 \iff l_{st2} = 0.41\lambda$

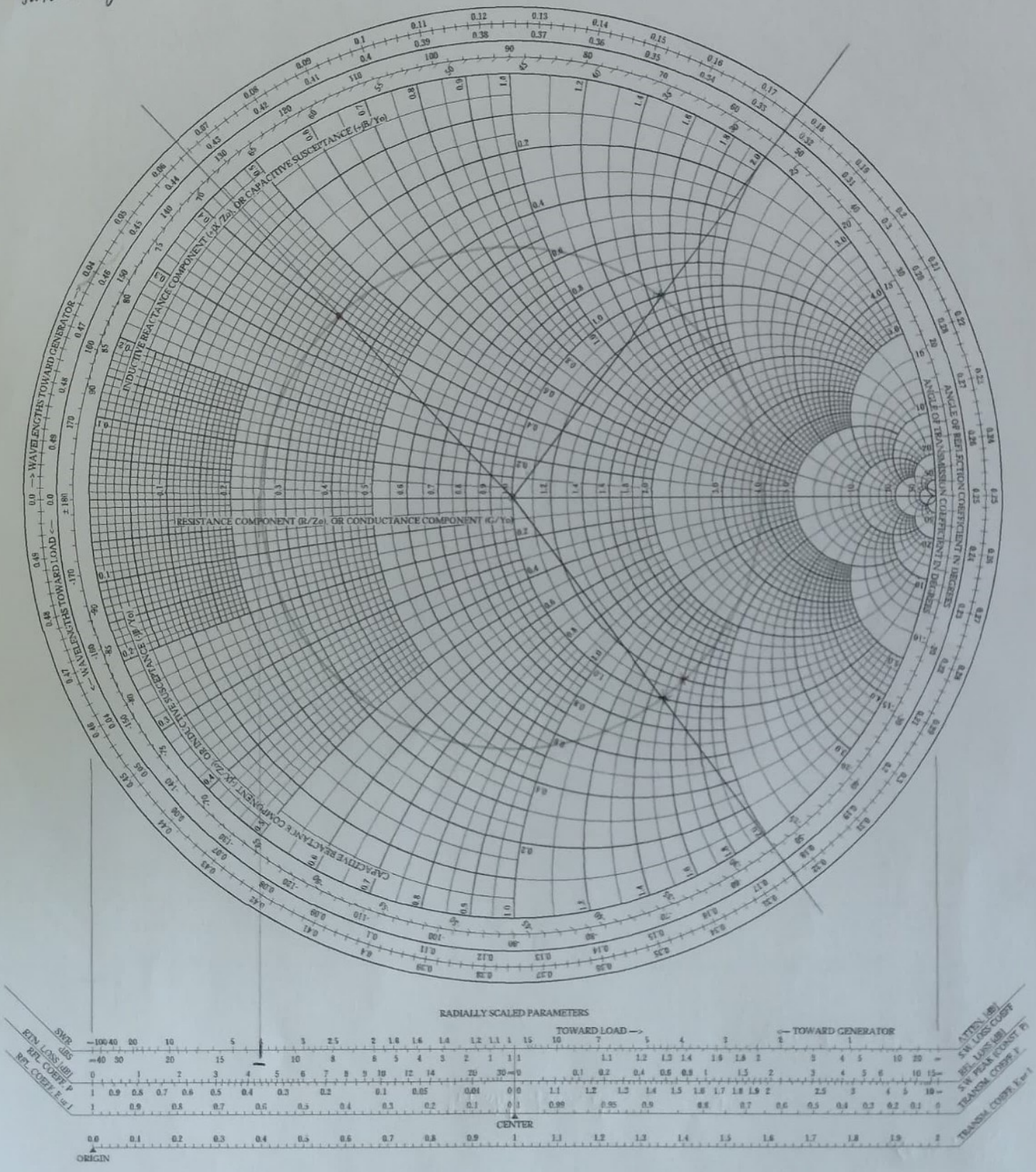
Melhor opção 1 → $l_1 = 0.11\lambda$ e $l_{st1} = 0.094\lambda$

b) SWR na linha: 1

SWR no Stub: ∞ (é um C.C)

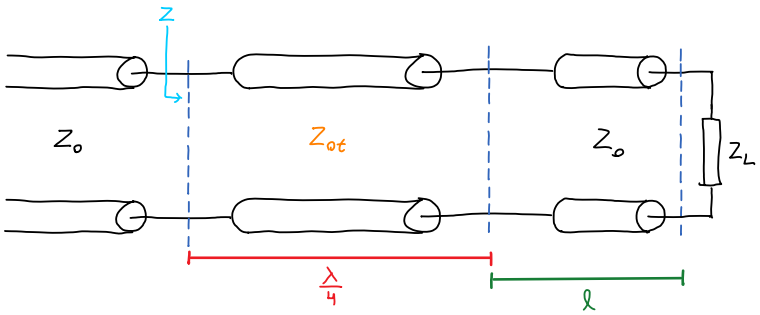
SWR na carga: 4

The Complete Smith Chart



8)

a)



Z_L já é real ($Z_L = 100\Omega$) $\Rightarrow \ell = 0$

Queremos: $Z = Z_0$

Logo $\frac{Z_{ot}^2}{Z_L} = Z \iff Z_{ot} = \sqrt{Z_0 Z_L} = \sqrt{5000} \approx 70.7\,\Omega$

b) Linha adaptada $\Rightarrow$ SWR = 1

c) $f = 1\,GHz$ $\quad c = \lambda^* f^* \iff \lambda f = \lambda^* f^* \iff \lambda = 1.1\,\lambda^*$

$f^* = 1.1\,GHz$

Como $f^* \neq 1\,GHz \Rightarrow Z^* \neq Z_0 \Rightarrow$ Não está adaptado

$$Z^* = Z_{ot}\frac{Z_L + jZ_{ot}\tan(\beta\frac{\lambda}{4})}{Z_{ot} + jZ_L\tan(\beta\frac{\lambda}{4})} = 50.92\,e^{0.109j}\ \Omega$$

$$\beta\frac{\lambda}{4} = \frac{2\pi}{\lambda^*}\frac{\lambda}{4} = \frac{1.1\pi}{2}$$

$$K_V = \frac{Z^* - Z_0}{Z^* + Z_0} \Rightarrow |K_V| = 0.055$$

$$SWR = \frac{1+|K_V|}{1-|K_V|} = 1.117$$