

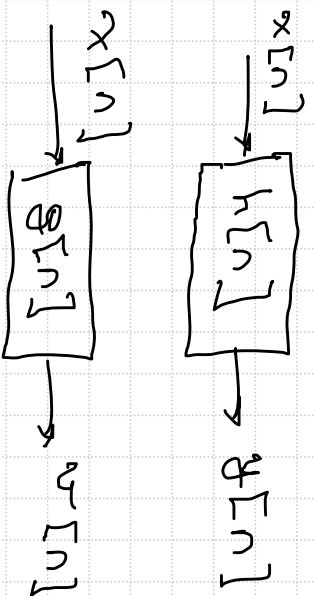
Rebomando videos:

$$h[n] = \left(\frac{1}{2}\right)^n u[n] \Rightarrow H(z) = \frac{1}{1 - \frac{1}{2}z}$$

$$\text{ROC: } \left|\frac{1}{2}z\right| < 1$$

$$g[n] = -\left(\frac{1}{2}\right)^n u[-n-1] \Rightarrow G(z) = \frac{1}{1 - \frac{1}{2}z} \quad |2z| < 1$$

Problema:



Determine $y[n]$ e $v[n]$ para

$$x[n] = \left(\frac{1}{4}\right)^n e^{2^n}$$

Objetivo do exercício:

Solidificar o significado de autofunção

$$\begin{array}{ccc} \tilde{z}_0^n & \xrightarrow{\quad} & \boxed{h[n]} \xrightarrow{\quad} \\ & & \left\{ \begin{array}{l} H(\tilde{z}_0) \tilde{z}_0^n \\ \infty \end{array} \right. \quad \text{se } \tilde{z}_0 \in \text{ROC de } h[n] \\ & & \text{c.c.} \end{array}$$

Nota: autofunção é $\tilde{z}_0^n$, não $\tilde{z}_0^n u[n]$

$$\Rightarrow \sum \{ \tilde{z}_0^n \} \neq \frac{1}{1 - \tilde{z}_0 \tilde{z}^{-1}}$$

$$\text{Caso 1: } x[n] = \left(\frac{1}{4}\right)^n \Rightarrow \tilde{z}_0 = \frac{1}{4}$$

$$\text{Para } h[n], \tilde{z}_0 = \frac{1}{4} \notin \text{ROC} \Rightarrow \text{saída } y[n] = \infty$$

$$\text{Para } g[n], \tilde{z}_0 = \frac{1}{4} \in \text{ROC} \Rightarrow y[n] = G(z) \Big|_{\tilde{z}=\frac{1}{4}} \left(\frac{1}{4}\right)^n = -1 * \left(\frac{1}{4}\right)^n$$

Relação entre auto função e resposta em freq.

Seja $x[n] = z_0^n$, com $z_0 = e^{j\omega_0} \Rightarrow x[n] = e^{j\omega_0 n}$

$$\text{Se } z_0 \in \text{ROC} \Rightarrow e^{j\omega_0 n} \xrightarrow{\boxed{h[n]}} e^{j\omega_0 n} |t(z)| \Big|_{z=z_0}$$

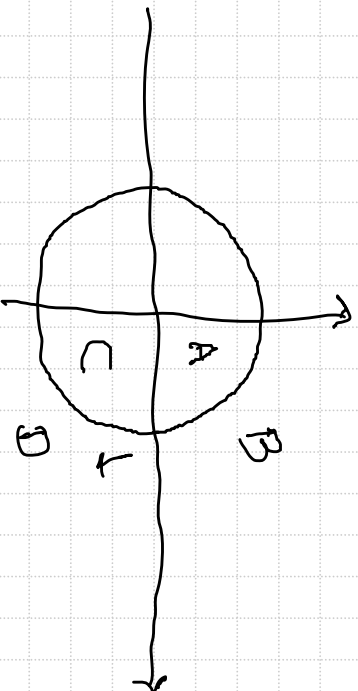
Mas $z_0 \in \text{ROC}$ se e $|z_0| = 1 \in \text{ROC}$

$\Rightarrow$ circunferência de raio unitário $\in \text{ROC}$

$\Rightarrow h[n]$ é estável

Problema:

Identifique $(2e^{i\pi/4})^*$ no gráfico



Problema: $e^{i\pi/3} + e^{-i\pi/3} =$

- a) 1 b) i c) $\sqrt{3}$ d) $\sqrt{3}i$

Problema: $e^{i\pi/6} - e^{-i\pi/6} =$

- a) 1 b) i c) $\sqrt{3}$ d) $\sqrt{3}i$

Pergunta: Os gráficos na página seguinte representam sinus na forma $\operatorname{Re}\{z^n\}$. Escolha um gráfico que possua:

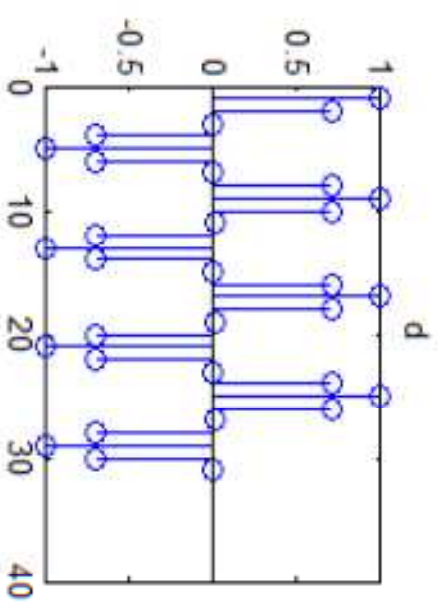
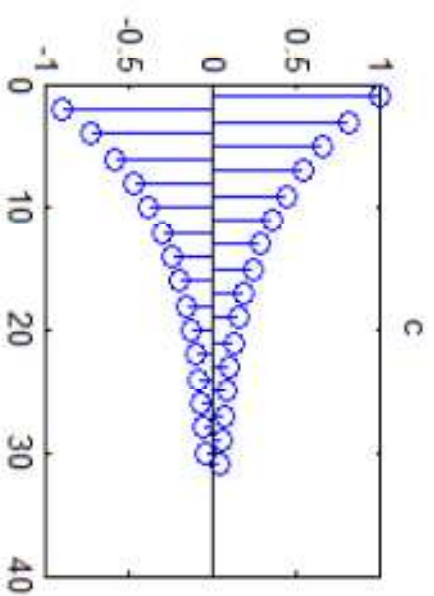
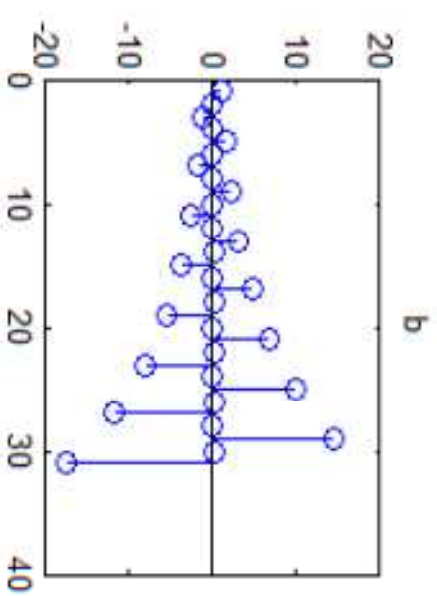
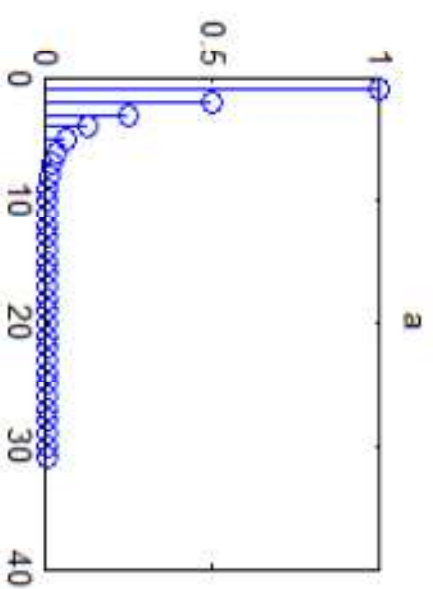
a) $|z| > 1$

b) $|z| = 1$

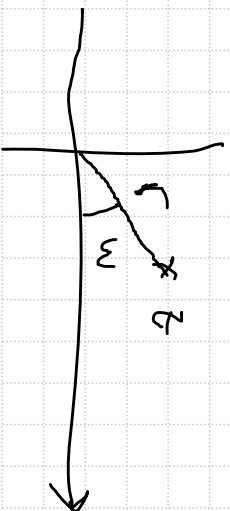
c) $|z| < 1$

Pergunta: Qual gráfico mostra o z com maior fase?

$\Re\{z^n\}$



Solução: Escreva $z = r e^{i u}$, $r = |z|$ $u = \angle z$



$$\Rightarrow z^n = r^n e^{i u n}$$

$$\Rightarrow \operatorname{Re} z^n = r^n \cos(u n)$$