$$u(t) = 70\sin(300\pi t + 0.23) + 70\sin(2700\pi t + 0.23)$$

$$\omega_0 = 300 \ = cel\ mai\ mare\ divizor\ comun\ al\ celor\ doua\ pulsatii\ ale\ componentelor$$

$$aducem\ semnalul\ la\ forma: \quad u(t) = \sum_{n=(-\infty)}^{\infty} c_n \cdot e^{j(n\omega t)}:$$

$$u(t) = 70(\frac{1}{2j}(e^{j(300\pi t+0.23)} - e^{-j(300\pi t+0.23)}) + \frac{1}{2j}(e^{j(2700\pi t+0.23)} - e^{-j(2700\pi t+0.23)}))$$

$$u(t) = -35j\left(\left(e^{j(300\pi t+0.23)} - e^{-j(300\pi t+0.23)}\right) + \left(e^{j(2700\pi t+0.23)} - e^{-j(2700\pi t+0.23)}\right)\right)$$

$$u(t) = 35j\left(e^{-j(300\pi t+0.23)} - e^{j(300\pi t+0.23)} - e^{j(2700\pi t+0.23)} + e^{-j(2700\pi t+0.23)}\right)$$

$$u(t) = 35j(e^{-j(300\pi t)} \cdot e^{-0.23j} - e^{j(300\pi t)} \cdot e^{0.23j} - e^{j(9*300\pi t)} \cdot e^{0.23j} + e^{-j(9*300\pi t)} \cdot e^{-0.23j})$$

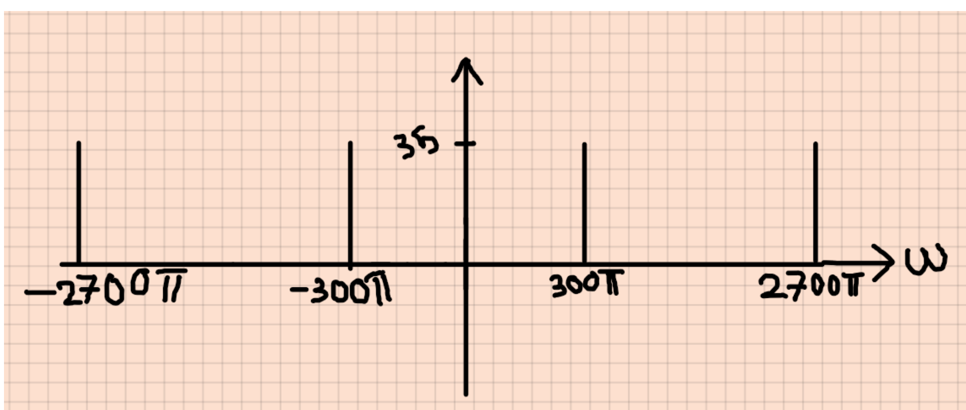
$$c_1 = -35j \cdot e^{0.23j} = 35 \cdot e^{-j\cdot\frac{\pi}{2}} \cdot e^{0.23j} = 35 \cdot e^{j\left(0.23-\frac{\pi}{2}\right)}$$

$$c_{-1} = 35j \cdot e^{-0.23j} = 35 \cdot e^{j\frac{\pi}{2}} \cdot e^{-0.23j} = 35 \cdot e^{j(\frac{\pi}{2}-0.23)}$$

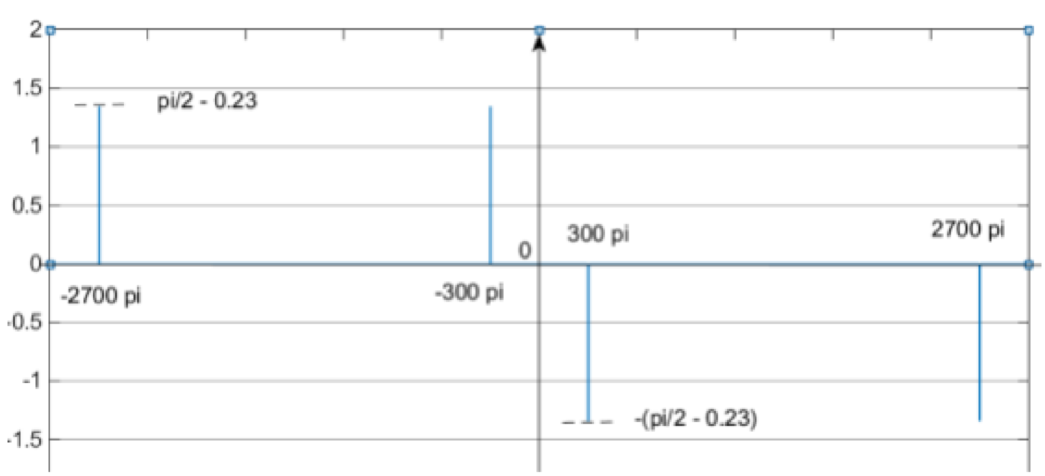
$$c_9 = -35j \cdot e^{0.23j} = 35 \cdot e^{j(0.23-\frac{\pi}{2})}$$

$$c_{-9} = 35j \cdot e^{-0.23j} = 35 \cdot e^{j(\frac{\pi}{2}-0.23)}$$

$$SA: \{(n \cdot \omega_0, |c_n|)\} = \{300\pi, 35); (-300\pi, 35); (2700\pi, 35); (2700\pi, 35)\}$$



$$SF: \{(n \cdot \omega_0, \arg(c_n))\} = \arg(c_n) = arctg\left(\frac{Im(c_n)}{Re(c_n)}\right)$$



Complex number

- Standard form

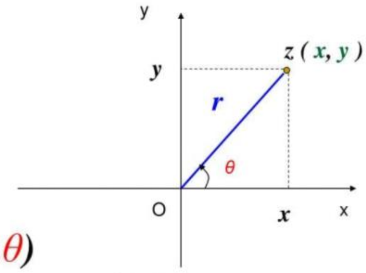
$$z = x + y\,i$$

- Polar form

$$z = r\,(\cos\theta + i\,\sin\theta)$$

- Exponential form

$$z = re^{i\theta}$$



$$r = \sqrt{x^2 + y^2}$$

$$Arg z = \arctan\left(\frac{y}{x}\right) \in (-\pi, \pi]$$

Argand Diagram

$$\begin{cases} e^{jx} = \cos(x) + j\sin(x) \\ e^{-jx} = \cos(x) - j\sin(x) \end{cases} \rightarrow \begin{cases} \sin(x) = \dfrac{1}{2j}\left(e^{jx} - e^{-jx}\right) \\ \cos(x) = \dfrac{1}{2}\left(e^{jx} + e^{-jx}\right) \end{cases}$$

$$j = e^{j\cdot\frac{\pi}{2}}\ ;\ -1 = e^{j\cdot\pi}\ ;\ -j = e^{j\cdot(-\frac{\pi}{2})}$$

$$\left|a \cdot e^{jx}\right| = a \cdot |\cos(x) + j\sin(x)| =$$

$$= a \cdot \sqrt{\cos^2(x) + \sin^2(x)} = a$$