Resolució Practica 1

1

$s_1(t) = 10\sin(2\pi 100t + \pi/4)$

$s_2(t) = \sin(2\pi 200t + \pi/6)$

$s_3(t) = 4\sin(2\pi 300t)$

Farem servir que

$$\sin x = \frac{1}{2j}(e^{jx} - e^{-jx})$$

$$s(t) = s_1(t) + s_2(t) + s_3(t) =$$

$$= \frac{10}{2j}\left(e^{j\pi/4}e^{j2\pi 100t} - e^{-j\pi/4}e^{-j2\pi 100t}\right) + \frac{1}{2j}\left(e^{j\pi/6}e^{j2\pi 200t} - e^{-j\pi/6}e^{-j2\pi 200t}\right) +$$

$$+ \frac{4}{2j}\left(e^{j2\pi 300t} - e^{-j2\pi 300t}\right)$$ diem que:

$$e^{jA} = e^{j2\pi 100t}$$

$$e^{jB} = e^{j2\pi 200t} \quad i \quad \frac{1}{2j} = \frac{-j}{2}$$ escribim que

$$e^{jC} = e^{j2\pi 300t}$$

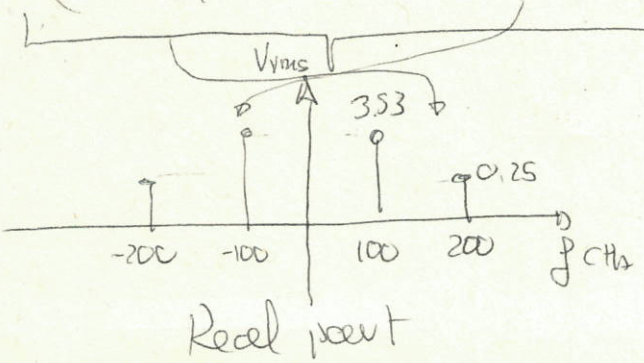
$$s(t) = -5j\left(e^{j\pi/4}e^{jA} - e^{-j\pi/4}e^{-jA}\right) - \frac{j}{2}\left(e^{j\pi/6}e^{jB} - e^{-j\pi/6}e^{-jB}\right) - 2j\left(e^{jC} - e^{-jC}\right)$$

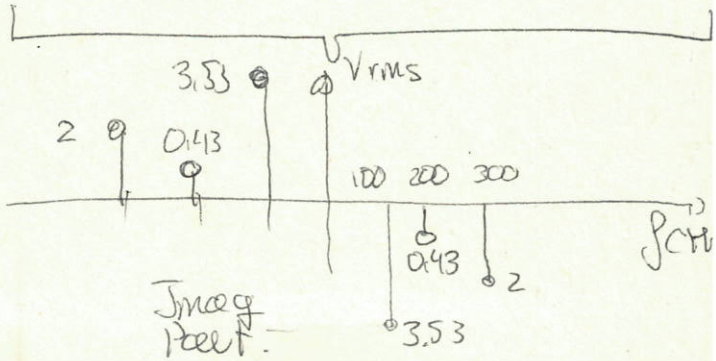
$$e^{j\pi/4} = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}j \Rightarrow -5je^{j\pi/4} = \frac{5}{\sqrt{2}} - \frac{5}{\sqrt{2}}j \qquad e^{-j\pi/4} = \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}j \Rightarrow -5je^{-j\pi/4} = \frac{-5}{\sqrt{2}} - \frac{5}{\sqrt{2}}j$$

$$e^{j\pi/6} = \frac{\sqrt{3}}{2} + \frac{1}{2}j \Rightarrow -\frac{j}{2}e^{j\pi/6} = \frac{1}{4} - \frac{\sqrt{3}}{4}j \qquad e^{-j\pi/6} = \frac{\sqrt{3}}{2} - \frac{1}{2}j \Rightarrow \frac{-j}{2}e^{-j\pi/6} = -\frac{1}{4} - \frac{\sqrt{3}}{4}j$$

$$s(t) = \left(\frac{5}{\sqrt{2}} - \frac{5}{\sqrt{2}}j\right)e^{jA} + \left(\frac{5}{\sqrt{2}} + \frac{5}{\sqrt{2}}j\right)e^{-jA} + \left(\frac{1}{4} - \frac{\sqrt{3}}{4}j\right)e^{jB} + \left(\frac{1}{4} + \frac{\sqrt{3}}{4}j\right)e^{-jB} - 2je^{jC} + 2je^{-C} =$$

$$= \left(\frac{5}{\sqrt{2}}e^{jA} + \frac{1}{4}e^{jB}\right) + \left(\frac{5}{\sqrt{2}}e^{-jA} + \frac{1}{4}e^{-jB}\right) + j\left(\frac{-5}{\sqrt{2}}e^{jA} - \frac{\sqrt{3}}{4}e^{jB} - 2e^{jC}\right) + j\left(\frac{5}{\sqrt{2}}e^{-jA} + \frac{\sqrt{3}}{2}e^{-jB} + 2e^{-}\right)$$





2) $scb = 0{,}5 \sin(2\pi 200t) \cdot \sin(2\pi 3000t)$ Si

$\sin A \cdot \sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$

$\Rightarrow scb = 0{,}25[\cos(2\pi 2800t) - \cos(2\pi 3200t)]$