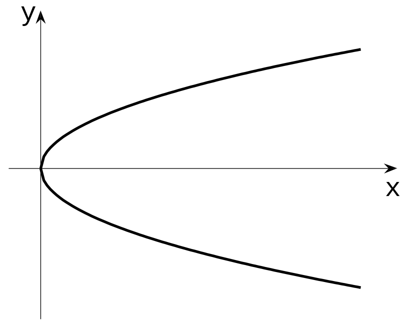
ΗΥ215: Λύσεις 1ης Σειράς Ασκήσεων

2008

1. $|x+jy-1| = \Re\{x+jy\}+1 \Rightarrow \sqrt{(x-1)^2+y^2} = x+1 \Rightarrow \sqrt{x^2-2x+1+y^2} = x+1 \Rightarrow$
   $x^2-2x+1+y^2 = x^2+2x+1 \Rightarrow y^2 = 4x$

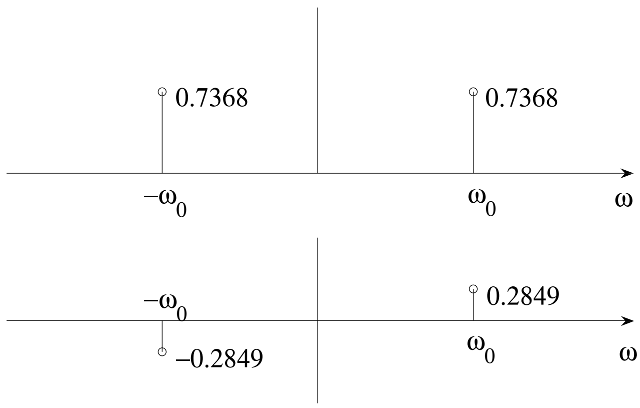


2. Έστω $z_1 = a_1 + jb_1$ και $z_2 = a_2 + jb_2$
   $(z_1 z_2)^* = [(a_1+jb_1)(a_2+jb_2)]^* = [a_1a_2 - b_1b_2 + j(a_1b_2 + a_2b_1)]^* = (a_1a_2 - b_1b_2) - j(a_1b_2 + a_2b_1)$
   $z_1^* z_2^* = (a_1 - jb_1)(a_2 - jb_2) = (a_1a_2 - b_1b_2) - j(a_1b_2 + a_2b_1)$
   Οπότε ισχύει.
   $(e^z)^* = (e^{x+jy})^* = (e^x e^{jy})^* = e^x e^{-jy} = e^{x-jy} = e^{z^*}$

3. $e^{-z} = e^{-x}e^{-jy} = \frac{1}{e^x}(\cos y - j\sin y)$
   $\frac{1}{e^z} = \frac{1}{e^x e^{jy}} = \frac{1}{e^x}\frac{1}{\cos y + j\sin y} = \frac{1}{e^x}\frac{\cos y - j\sin y}{\cos^2 y + j\sin^2 y} = \frac{1}{e^x}(\cos y - j\sin y)$
   Άρα ισχύει.

4. $(1+j)(5-j)^4 = \sqrt{2}e^{j\frac{\pi}{4}}26^2 e^{j4\theta}$ (1) όπου $\theta = -\tan^{-1}\frac{1}{5}$
   Επίσης $(1+j)(5-j)^4 = 956 - j4 = 956.0084e^{-j\tan^{-1}\frac{4}{956}}$ (2)
   $(1) = (2) \Rightarrow \frac{\pi}{4} - 4\tan^{-1}\frac{1}{5} = -\tan^{-1}\frac{1}{239} \Rightarrow \frac{\pi}{4} = 4\tan^{-1}\frac{1}{5} - \tan^{-1}\frac{1}{239}$

5. $x(t) = 2\cos(\omega_0 t + \frac{\pi}{4}) + \cos(\omega_0 t - \frac{\pi}{2}) = \Re\{2e^{j\frac{\pi}{4}}e^{j\omega_0 t} + e^{-j\frac{\pi}{2}}e^{j\omega_0 t}\} = \Re\{(2e^{j\frac{\pi}{4}} + e^{-j\frac{\pi}{2}})e^{j\omega_0 t}\} =$
   $= \Re\{1.4736e^{j0.2849}e^{j\omega_0 t} = 1.4736\cos(\omega_0 t + 0.2849)$


0.7368
0.7368
$-\omega_0$
ω_0
ω
$-\omega_0$
0.2849
ω_0
ω
−0.2849