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Mathematica 12.0.0 Kernel for Linux x86 (64-bit)

In[1]:= z=1/(1+I)

In[2]:= {Abs[z], Arg[z]}

               1      -Pi
Out[2]= {-------, ---}
         Sqrt[2]   4

In[3]:= z=(3+I)/(1+3 I)

In[4]:= {Abs[z], Arg[z]}

                        4
Out[4]= {1, -ArcTan[-]}
                        3
In[5]:= N[%]

Out[5]= {1., -0.927295}

In[6]:= z=1/Conjugate[1+I]

In[7]:= {Abs[z], Arg[z]}

               1      Pi
Out[7]= {-------, --}
         Sqrt[2]  4

In[8]:= z=Abs[1/(1+I)]

In[9]:= {Abs[z], Arg[z]}

               1
Out[9]= {-------, 0}
         Sqrt[2]

In[10]:= (3I -7)/(I+4)

             25     19 I
Out[10]= -(--) + ----
             17     17

In[11]:= (.64+ .77 I)^4

Out[11]= -0.937808 - 0.361321 I

In[12]:= Sqrt[3+4 I]

Out[12]= 2 + I

In[13]:= 25 Exp[I 2.]

Out[13]= -10.4037 + 22.7324 I

In[14]:= Log[-1]

Out[14]= I Pi
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(4) $a_1\cos(\omega t+\delta_1)+a_2\cos(\omega t+\delta_2)+a_3\cos(\omega t+\delta_3)$

$= \mathrm{Re}\left[a_1 e^{i\omega t+\delta_1} + a_2 e^{i\omega t+\delta_2} + a_3 e^{i\omega t+\delta_3}\right]$

$= \mathrm{Re}\left[\underbrace{(a_1e^{i\delta_1}+a_2e^{i\delta_2}+a_3e^{i\delta_3})}_{6.61e^{i.4105}}\, e^{i\omega t}\right]$

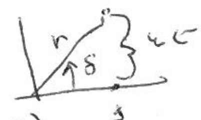
$= 6.61\cos(\omega t+.4105)$

(7) define $\frac{L}{R}=\tau$ $\quad \frac{V_0}{R}=\tilde{I}$

$\tau\frac{dI}{dt}+I=\tilde{I}e^{i\omega t}$ $\quad I=I_0e^{i\omega t}$

$(i\omega\tau+1)I_0e^{i\omega t}=\tilde{I}e^{i\omega t}$

$I_0=\frac{\tilde{I}}{1+i\omega\tau}=\frac{\tilde{I}}{r}e^{-i\delta}$



$\delta=\tan^{-1}(\omega\tau)$

$r=\sqrt{1+(\omega\tau)^2}$

$I=\frac{\tilde{I}}{\sqrt{1+(\omega\tau)^2}}\cos(\omega t-\delta)$

(9) $e^{i\theta}e^{i\phi}=e^{i(\theta+\phi)}=\cos(\theta+\phi)+i\sin(\theta+\phi)$

$\quad\|$

$(\cos\theta+i\sin\theta)(\cos\phi+i\sin\phi)$

$=(\cos\theta\cos\phi-\sin\theta\sin\phi)$

$\quad +i(\sin\theta\cos\phi+\cos\theta\sin\phi)$

Equate Re parts; Equate imaginary parts

$\cos\theta\cos\phi-\sin\theta\sin\phi=\cos(\theta+\phi)$

$\sin\theta\cos\phi+\cos\theta\sin\phi=\sin(\theta+\phi)$