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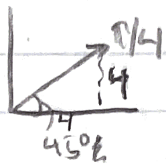
COSC 360 QUIZ 1

Convert to Polar form

1. $z = 4 + 4j$



$= 4\sqrt{2}e^{j\pi/4}$

2. $z = 1,\ z = j,\ z = -1,\ z = -j$

$z = 1 + 0j \Rightarrow z = 1e^{j(0)} = 1$

$z = 0 + j \Rightarrow z = 1e^{j\pi/2}$

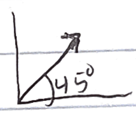
$z = -1 + 0j \Rightarrow z = 1e^{j\pi}$

$z = 0 - j \Rightarrow z = 1e^{-j\pi/2}$

3. Starting with $z = 1$, ϕ is changing by $\pi/2$ every time, or $90°$, and the vector only has a length of 1 unit.

Convert to rect. form

1. $z = 2e^{j\pi/4}$



$\phi = \pi/4$ $\quad \tan(\phi) = \frac{y}{x}$

$\tan(\pi/4) = 1,\ y = x$

$4 = x^2 + y^2,$

$z = \sqrt{2} + \sqrt{2}j$

2. $z = 5e^{j\pi}$

$25 = x^2$

$z = -5$

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1. Compute $|v|^2 = (v)(v)$, $\phi_2 - \phi_1 = \pi$, $\phi_2 - \phi = 0$

$|v| = \sqrt{(a_1 e^{jx_1})^2 + (a_2 e^{jx_2})^2} \Rightarrow |v|^2 = \left(\sqrt{(a_1 e^{jx_1})^2 + (a_2 e^{jx_2})^2}\right)^2$

$|v|^2 = (a_1 e^{jx_1})^2 + (a_2 e^{jx_2})^2$

$|v|^2 = v^* v = a_1 e^{j(2\pi f t + \phi_1)} + a_2 e^{j(2\pi f t + \phi_2)}$

$\Phi_2 - \Phi_1 = \pi \Rightarrow \Phi_2 = \Phi_1 + \pi$

$\Phi_1 = \Phi_2 - \pi$

$x_1 = 2\pi f t + \Phi_1$

$x_2 = 2\pi f t + (\Phi_1 + \pi)$

$$V(t) = a_1 e^{j(2\pi f t + \Phi_1)} + a_2 e^{j(2\pi f t + \Phi_1 + \pi)}$$

$\Phi_2 - \Phi_1 = 0 \Rightarrow \Phi_2 = \Phi_1$

$$V(t) = a_1 e^{j(2\pi f t + \Phi_1)} + a_2 e^{j(2\pi f t + \Phi_1)}$$

$$V(t) = (a_1 + a_2) e^{j(2\pi f t + \Phi_1)}$$

2. $\Phi_V = \tan^{-1}(\mathrm{Im}\{V\} / \mathrm{Re}\{V\})$??

$\Phi_2 - \Phi_1 = \pi$: $\Phi_V = \mathrm{Tan}^{-1}\left(4\pi f t + 2\Phi + \pi / a_1 + a_2\right)$

$\Phi_2 = \Phi_1$: $\Phi_V = \mathrm{Tan}^{-1}\left(2\pi f t + \Phi_1 / a_1 + a_2\right)$

$L = 0 \; (Z_2 = 0)$

$$h(\omega) = \frac{Z_3}{Z_1 + Z_3}$$

$$\frac{1}{\omega_{LC}} = 0(c) = 0$$

$$T = RC$$

$$k^2 = 1 - (\omega \cdot 0)^2 = 1$$

$$h(\omega) = \frac{(k^2)^2}{(k^2)^2 + (\omega T)^2} - j \frac{k^2 \omega T}{(k^2)^2 + (\omega T)^2}$$

$$h(\omega) = \frac{1}{1 + (\omega T)^2} - j \frac{\omega T}{1 + (\omega T)^2}$$

graph??