

Question

Express the complex number

$$\frac{4}{1-j\sqrt{3}}$$

as a phasor $re^{j\theta}$.

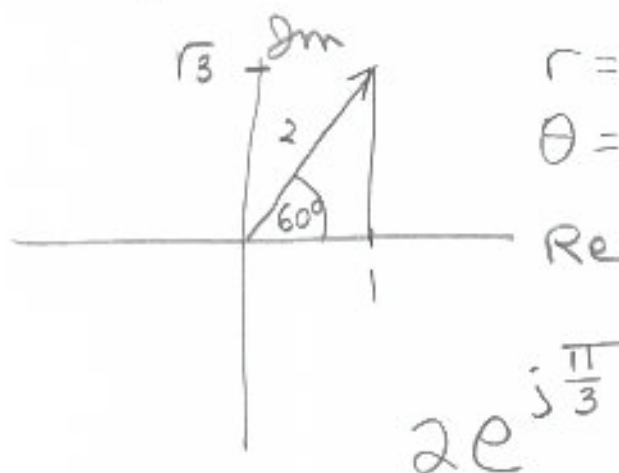
Make sure $r \geq 0$

and $-\pi < \theta \leq \pi$ (express in radians)

Draw a picture of the phasor
on the complex plane.

Answer

$$\frac{4}{1-j\sqrt{3}} \cdot \frac{1+j\sqrt{3}}{1+j\sqrt{3}} = \frac{4(1+j\sqrt{3})}{1+3} = 1+j\sqrt{3}$$



$$r = 2$$
$$\theta = 60^\circ = \frac{\pi}{3}$$

$$2e^{j\frac{\pi}{3}}$$

Question

Express the complex number

$$\frac{3}{\sqrt{2}} - j\frac{3}{\sqrt{2}}$$

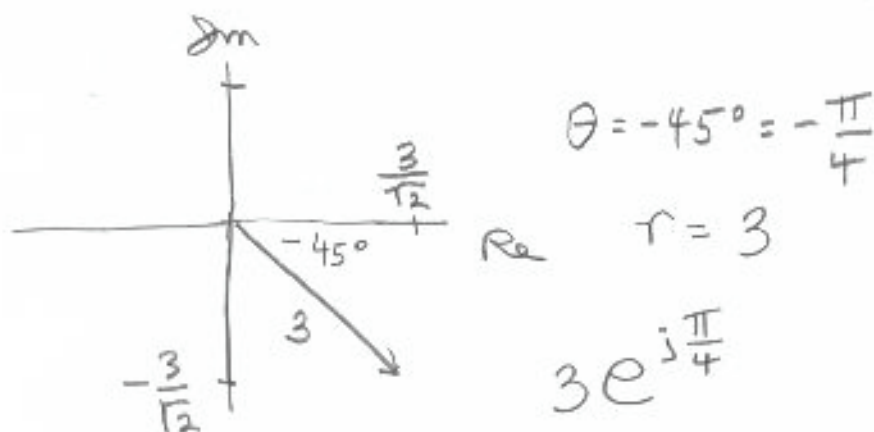
as a phasor $re^{j\theta}$

Make sure $r \geq 0$

and $-\pi < \theta \leq \pi$ (express in radians)

Draw a picture of the phasor
on the complex plane.

Answer



Question

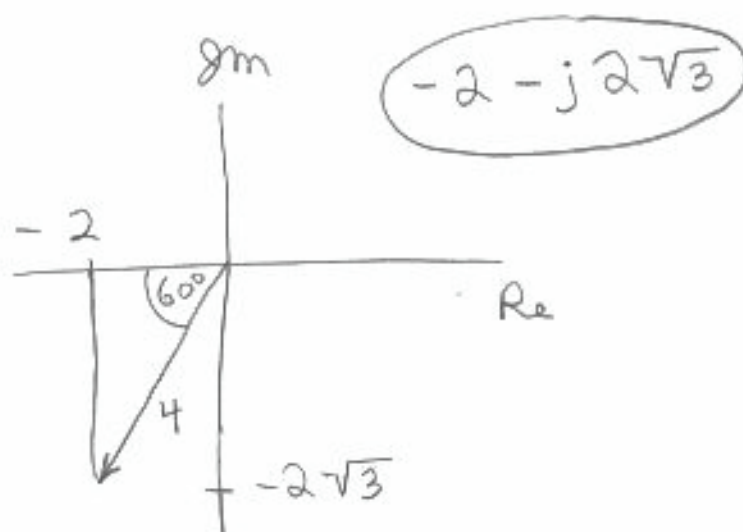
Draw a picture of the phasor

$$4 e^{-j \frac{2\pi}{3}}$$

and express it in cartesian
form

$$x + jy$$

Answer



Question

Prove the following
using phasors

$$\int \cos(\omega t) dt = \frac{1}{\omega} \sin(\omega t)$$

Answer

$$\cos(\omega t) = \frac{e^{j\omega t} + e^{-j\omega t}}{2}$$

$$\int \frac{e^{j\omega t}}{2} dt + \int \frac{e^{-j\omega t}}{2} dt =$$

$$\frac{1}{\omega} \cdot \frac{e^{j\omega t} - e^{-j\omega t}}{2j} = \frac{1}{\omega} \sin(\omega t)$$

Question

Prove the following
using phasors

$$\cos(s) \cos(t) = \frac{\cos(s+t) + \cos(s-t)}{2}$$

Answer

$$\begin{aligned} & \frac{\overbrace{\cos(s)}^{e^{js} + e^{-js}}}{2} \cdot \frac{\overbrace{\cos(t)}^{e^{jt} + e^{-jt}}}{2} = \\ & \frac{e^{j(s+t)} + e^{-j(s+t)}}{4} + \frac{e^{j(s-t)} + e^{-j(s-t)}}{4} = \\ & \frac{\cos(s+t)}{2} + \frac{\cos(s-t)}{2} \end{aligned}$$

Question

Sketch $x[n] = \delta[n] + 2\delta[n+1]$

Then sketch the even and odd parts of $x[n]$,
 $\text{Ev}\{x[n]\}$ and $\text{Od}\{x[n]\}$
 labeling key values.

Hint:

$$x[n] = \text{Ev}\{x[n]\} + \text{Od}\{x[n]\}$$

Answer



$$\text{Ev}\{x[n]\} = \frac{x[n] + x[-n]}{2}$$



$$\text{Od}\{x[n]\} = \frac{x[n] - x[-n]}{2}$$



Question

for $x(t) = u(t+1)$

sketch $x(t)$, $\mathcal{E}_v\{x(t)\}$, $\mathcal{O}_d\{x(t)\}$

label axes and key values

Make sure that

$$x(t) = \mathcal{E}_v\{x(t)\} + \mathcal{O}_d\{x(t)\}$$

Answer

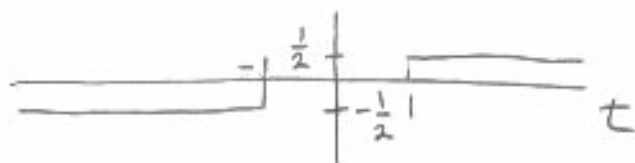
$$x(t) = u(t+1)$$



$$\mathcal{E}_v\{x(t)\} = [u(t+1) + u(-t+1)]/2$$



$$\mathcal{O}_d\{x(t)\} = [u(t+1) - u(-t+1)]/2$$



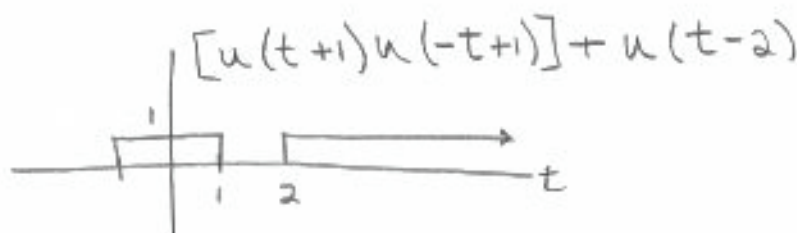
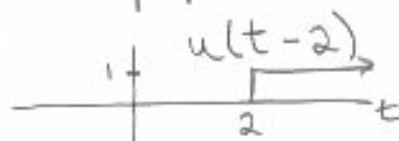
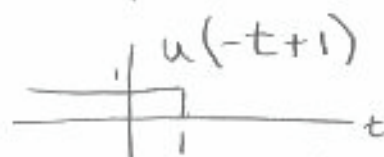
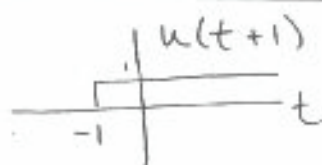
Question

Sketch the following function
 $[u(t+1)u(-t+1)] + u(t-2)$

hint: sketch each of the
component unit step functions first.

Label axes and key values

Answer



Use 0.7 mm mechanical pencil. Keep 0.25 inch from edge of box. Erase mistakes thoroughly.

GC8

Problem Type Acronym

Name

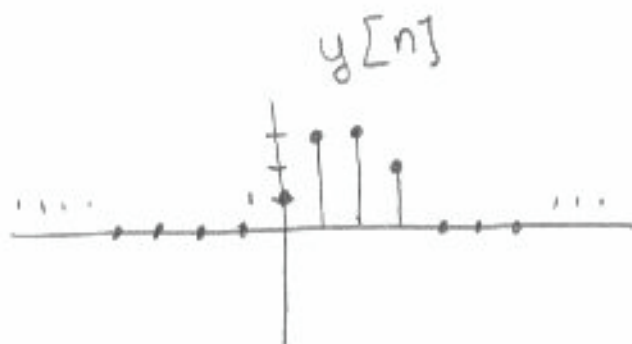
ID #

Question



sketch $y[n] = x[n] * h[n]$

Answer



Use 0.7 mm mechanical pencil. Keep 0.25 inch from edge of box. Erase mistakes thoroughly.

GC9

Problem Type Acronym

Name

ID #

Question

$$x(t) = -u(t+1)$$



$$h(t) = -\delta(t-1)$$



$$\text{Sketch } y(t) = x(t) * h(t)$$

Answer

