Student Information

Full Name : Ömer Kılınç
Id Number : 2448603

Answer 1

$$z = \frac{\sqrt{2} + \sqrt{2}i}{2 + 2\sqrt{3}i}$$

$$= \frac{1}{\sqrt{2}} * \frac{1+i}{1+\sqrt{3}i}$$

Exponential Representation of (1+i):

$$r = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$\theta = arctan(\frac{1}{1}) = \frac{\pi}{4}$$

$$1+i = \sqrt{2}e^{i\frac{\pi}{4}}$$

Similarly, Exponential Representation of $1 + \sqrt{3}i$:

$$r = \sqrt{1^2 + \sqrt{3}^2} = 2$$

$$\theta = arctan(\frac{\sqrt{3}}{1}) = \frac{\pi}{3}$$

$$1 + \sqrt{3}i = 2e^{i\frac{\pi}{3}}$$

Using these representations:

$$z = \frac{1}{\sqrt{2}} * \frac{\sqrt{2}e^{i\frac{\pi}{4}}}{2e^{i\frac{\pi}{3}}}$$

$$z = \frac{1}{2}e^{-i\frac{\pi}{12}} \; (*)$$

$$= \frac{1}{2}(cos(-\frac{\pi}{12}) + i * sin(-\frac{\pi}{12}))$$

$$z = 0.483 - 0.1294i \; (**)$$

a)

By equation (**):

$$Rez = 0.483$$

$$Imz = -0.1294$$

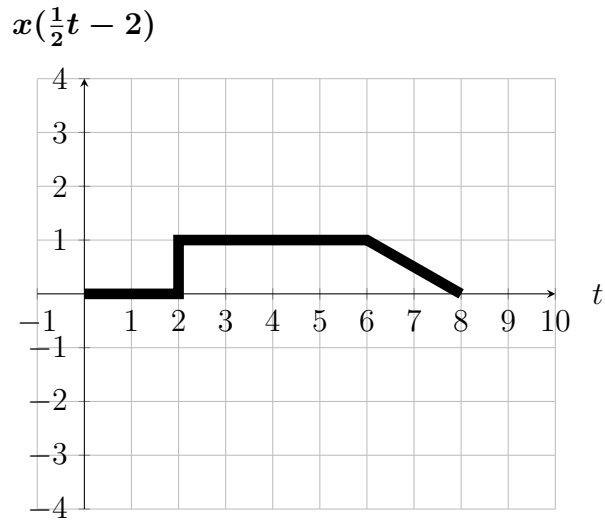**b)**

Answer 2

$x(\frac{1}{2}t - 2)$

Figure 1: t vs. $x(\frac{1}{2}t - 2)$.

Answer 3

a)

$$\sum_{k=-3}^{3} x[k]\delta[n-k]$$

$$= \delta[n+3] - \delta[n+2] - \delta[n+1] - \delta[n] + \delta[n-1] + 2\delta[n-2] + \delta[n-3]$$