به نام خدا

پاسخ کوییز اول

درس سیگنال‌ها و سیستم‌ها - دکتر اخوان

دانشگاه تهران – دانشکده مهندسی برق و کامپیوتر

۱)

الف)

$$-2jsin\left(\frac{\pi}{6}t\right)e^{j\frac{\pi}{6}t} = -2jsin\left(\frac{\pi}{6}t\right)\left(cos\left(\frac{\pi}{6}t\right) + jsin\left(\frac{\pi}{6}t\right)\right)$$

$$-2jsin\left(\frac{\pi}{6}t\right)cos\left(\frac{\pi}{6}t\right) + 2sin^2\left(\frac{\pi}{6}t\right) = -jsin\left(\frac{\pi}{6}t \times 2\right) - cos\left(\frac{\pi}{6}t \times 2\right) + 1$$

$$1 - \left(cos\left(\frac{\pi}{3}t\right) + jsin\left(\frac{\pi}{3}t\right)\right) = 1 - e^{j\frac{\pi}{3}t}$$

ب)

$$z = 2 \times \frac{\sqrt{2}}{2}(1+j) = 2\left(\frac{\sqrt{2}}{2} + j\frac{\sqrt{2}}{2}\right) = 2\left(cos\left(\frac{\pi}{4}\right) + jsin\left(\frac{\pi}{4}\right)\right)$$

$$re^{j\theta} = r\big(cos(\theta) + jsin(\theta)\big) \equiv 2\left(cos\left(\frac{\pi}{4}\right) + jsin\left(\frac{\pi}{4}\right)\right) \rightarrow r = 2, \qquad \theta = \frac{\pi}{4}$$

$$z = re^{j\theta} = 2e^{j\frac{\pi}{4}}$$

ج)

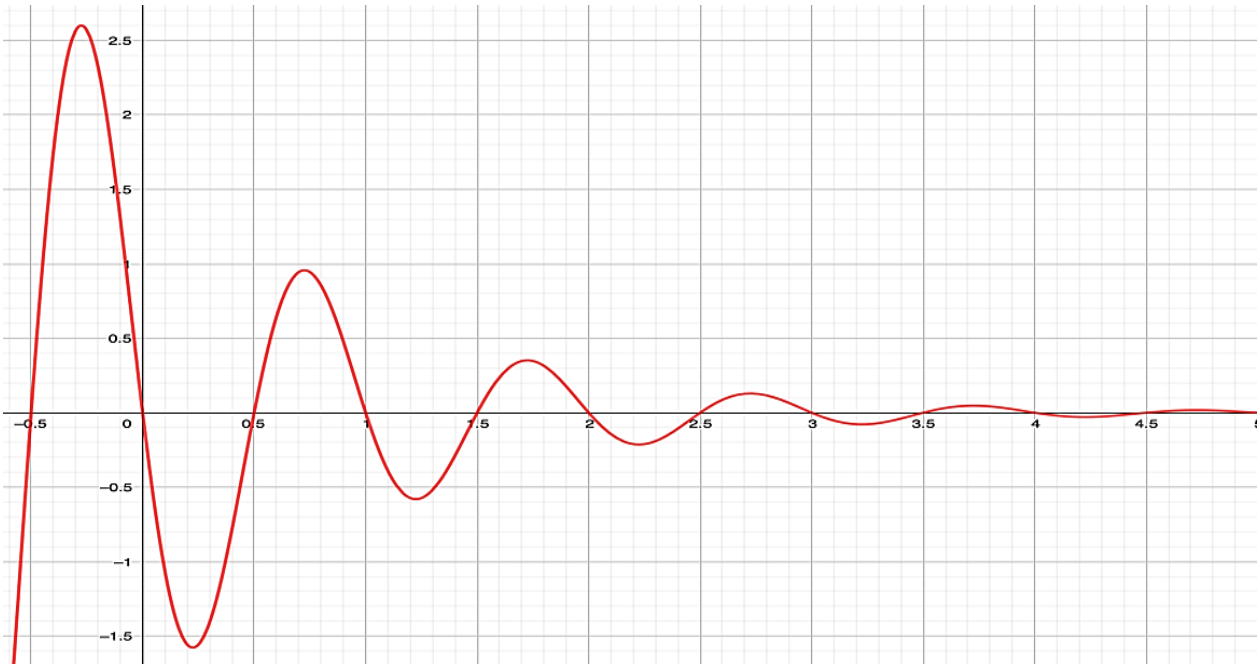
$$x(t) = \sqrt{2}(1+j)e^{j\frac{\pi}{4}}e^{(-1+2j\pi)t}$$

$$x(t) = 2e^{j\frac{\pi}{4}} \times e^{j\frac{\pi}{4}} \times e^{2j\pi t} \times e^{-t} = 2e^{j\frac{\pi}{2}} \times \frac{1}{e^t} \times \big(cos(2\pi t) + jsin(2\pi t)\big)$$

$$x(t) = \frac{2j}{e^t}\big(cos(2\pi t) + jsin(2\pi t)\big) = \frac{2}{e^t}\big(jcos(2\pi t) - sin(2\pi t)\big)$$

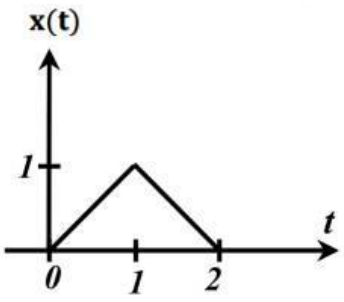
د)

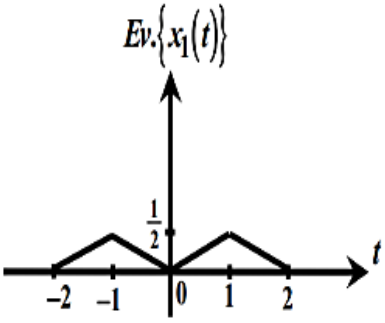
$$\Re\{x(t)\} = \frac{-2}{e^t} sin(2\pi t)$$

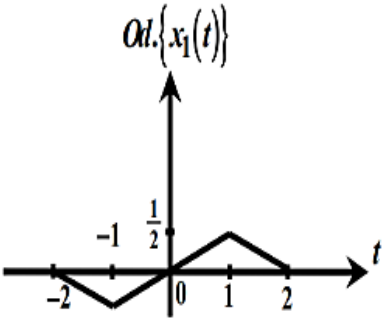


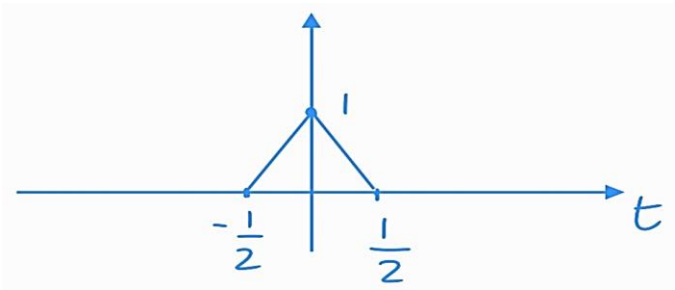
٢)

الف)









ب)

$$y(t) = \mathrm{x}(2\left(\mathrm{t} + \frac{1}{2}\right))$$