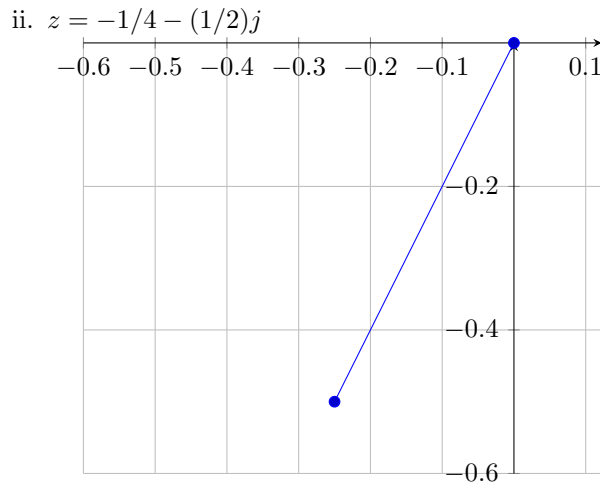# CENG 384 - Signals and Systems for Computer Engineers
Spring 2020
Written Assignment 1
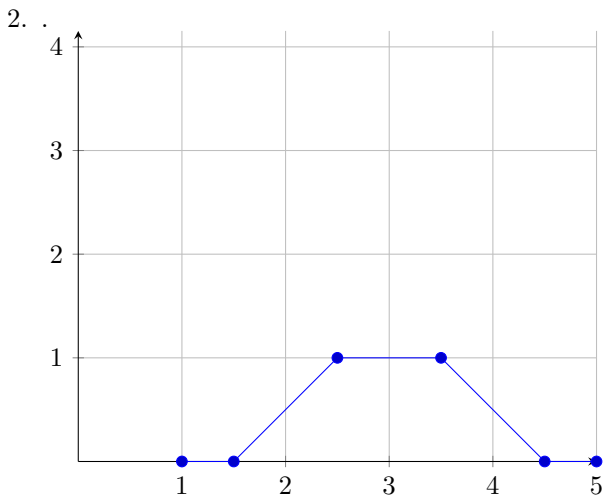
Özalp, Zeynep
e2237691@ceng.metu.edu.tr

Yıldırım, Hilmi Cihan
e2237949@ceng.metu.edu.tr
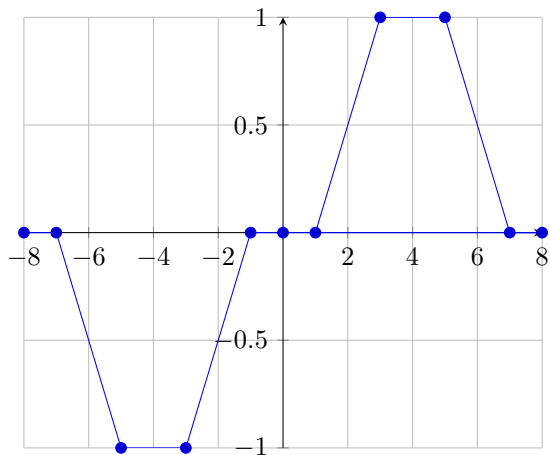
February 20, 2020

---

1. (a)   i. $\bar{z} = x - yj$

   $z + 1 = j - 3(x - yj) \Rightarrow z + 1 = j - 3x + 3yj \Rightarrow x + yj + 1 = j - 3x + 3yj$

   $x + 1 = -3x \Rightarrow x = -1/4 \Rightarrow y = -1/2$

   $z = -1/4 - (1/2)j$
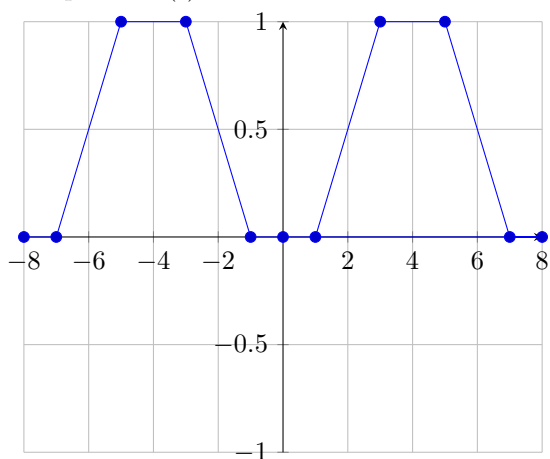
   $|z|^2 = (-1/4 - (1/2)j) * (-1/4 + (1/2)j) = 5/16$

      ii. $z = -1/4 - (1/2)j$

   (b) z in polar form $z^2 = r^2 e^{2j\theta} = 25j$

   $r^2 = cos2\theta + jsin2\theta = 25j$

   $cos2\theta = 0$ and $sin2\theta = 1$ then $r = \pm5$, $\theta = \pi/4$

   $z = \pm5e^{j\pi/4}$

   (c) z in polar form $\Rightarrow \dfrac{\sqrt{2}e^{j\pi/4} * 2e^{-j\pi/3}}{\sqrt{2}e^{-j\pi/4}} = 2e^{j\pi/6}$

   magnitude is 2, angle is $\pi/6$.

   (d) $z = j(cos(-\pi/2) + jsin(-\pi/2)) = -j^2 = 1 \Rightarrow z = e^{j2\pi k}$, $k = 0, \pm1, \pm2...$

2. .

3. (a)

   (b)

4. (a) Yes. $N_0 = 48$.

   (b)

   (c) Yes. $T_0 = 3/5$

   (d) Yes. $T_0 = \pi$

5. Odd part of x(t):

   Even part of x(t):

6. (a) $x(t) = \mu(t-1) - 3\mu(t-3) + 4\mu(t-4)$

   (b) $\dfrac{dx(t)}{dt} = \dfrac{d\mu(t-1)}{dt} - 3\dfrac{d\mu(t-3)}{dt} + 4\dfrac{d\mu(t-4)}{dt} = \delta(t-1) - 3\delta(t-3) + 4\delta(t-4)$

   I could not draw arrows of unit impulse. So, I added triangles.