Sistemas Lineales
Introducción. Soluciones Numéricas de la Hoja de Problemas

1. (a) $\frac{1}{2}e^{j\pi} = -\frac{1}{2}$.

   (b) $\frac{1}{2}e^{-j\pi} = -\frac{1}{2}$.

   (c) $e^{j\pi/2} = j$.

   (d) $e^{-j\pi/2} = -j$.

   (e) $e^{j5\pi/2} = j$.

   (f) $\sqrt{2}e^{j\pi/4} = 1+j$.

   (g) $\sqrt{2}e^{j9\pi/4} = 1+j$.

   (h) $\sqrt{2}e^{-j9\pi/4} = 1-j$.

   (i) $\sqrt{2}e^{-j\pi/4} = 1-j$.

2. (a) $5 = 5e^{j0}$.

   (b) $-2 = 2e^{j\pi}$.

   (c) $-3j = 3e^{-j\frac{\pi}{2}}$.

   (d) $\frac{1}{2} - \frac{\sqrt{3}}{2}j = e^{-j\frac{\pi}{3}}$.

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

   (f) $(1-j)^2 = 2e^{-j\frac{\pi}{2}}$.

   (g) $j(1-j) = e^{j\frac{\pi}{4}}$.

   (h) $\frac{1+j}{1-j} = e^{j\frac{\pi}{2}}$.

   (i) $\frac{\sqrt{2}+j\sqrt{2}}{1+j\sqrt{3}} = e^{-j\frac{\pi}{12}}$.

3. (a) $\sqrt{9} = \{3, -3\}$.

   (b) $\sqrt[3]{27} = \{3, 3e^{j\frac{2\pi}{3}}, 3e^{j\frac{4\pi}{3}}\}$.

   (c) $\sqrt{-4} = \{2j, -2j\}$.

   (d) $\sqrt{5j} = \{\sqrt{5}e^{j\frac{\pi}{4}}, -\sqrt{5}e^{j\frac{\pi}{4}}\}$.

   (e) $x^8 = 256 \Rightarrow x = 2e^{j\frac{\pi}{4}k}, \quad k = 0, \ldots, 7$.

   (f) $\sqrt[5]{1} = e^{j\frac{2\pi}{5}k}, \quad k = 0, \ldots, 4$.

   (g) $x^4 = 625e^{j\pi/3} \Rightarrow x = 5e^{j\left(\frac{\pi}{12}+\frac{\pi}{2}k\right)}, \quad k = 0, \ldots, 3$.

4. (a) $\sum_{n=0}^{6} \left(\frac{1}{2}\right)^n = 2 - \left(\frac{1}{2}\right)^6$.

   (b) $\sum_{n=-3}^{9} \left(\frac{3}{2}\right)^n = 2\left[\left(\frac{3}{2}\right)^{10} - \left(\frac{2}{3}\right)^3\right]$.

   (c) $\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^n = 2$.

   (d) $\sum_{n=5}^{\infty} \left(\frac{1}{3}\right)^n = \frac{1}{2}\left(\frac{1}{3}\right)^4$.

(e) $\sum\limits_{n=1}^{\infty} n \left(\frac{1}{2}\right)^{(n-1)} = 4.$

(f) $\sum\limits_{n=1}^{8} n\alpha^{(n-2)} = \frac{1-\alpha^{(N+1)}-(N+1)(1-\alpha)\alpha^N}{\alpha(1-\alpha)^2}.$

(g) $\sum\limits_{n=-\infty}^{3} \left(\frac{3}{2}\right)^n = 3\left(\frac{3}{2}\right)^3.$

(h) $\sum\limits_{n=-5}^{13} \alpha = 19\alpha.$

(i) $\sum\limits_{n=1}^{\infty} \left(-\frac{1}{2}\right)^{(n+2)} = -\frac{1}{12}.$

(j) $\sum\limits_{n=3}^{\infty} \left(-\frac{1}{3}e^{j\frac{\pi}{3}}\right)^n = \frac{1}{9}\frac{1}{e^{j\frac{\pi}{3}}-3}.$

(k) $\sum\limits_{n=-5}^{13} \alpha = 19\alpha.$