

Practica 2

a)

$$A = \begin{bmatrix} 3 + \alpha & -1 \\ -1 & 2 + \alpha \end{bmatrix}$$

$$Tg = (D - L)^{-1}U = \begin{bmatrix} 3 + \alpha & 0 \\ -1 & 2 + \alpha \end{bmatrix}^{-1} \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$$

$$Tg = \begin{bmatrix} 0 & \frac{1}{3 + \alpha} \\ 0 & \frac{1}{(3 + \alpha)(2 + \alpha)} \end{bmatrix} \quad P(\lambda) = \det(Tg - \lambda I) = \lambda \left(\lambda - \frac{1}{(3 + \alpha)(2 + \alpha)} \right)$$

$$\rho(Tg) = \frac{1}{(3 + \alpha)(2 + \alpha)}$$

Para Convergencia: $\rho(Tg) < 1$

$$|(3 + \alpha)(2 + \alpha)| > 1$$

$$\alpha > \frac{\sqrt{5} - 5}{2} \quad \wedge \quad \alpha < \frac{-\sqrt{5} - 5}{2}$$

b)

$$x_1^{(n+1)} = \frac{5 + x_2^{(n)}}{4}$$

$$x_2^{(n+1)} = \frac{-4 + x_1^{(n)}}{3}$$

$$\delta(\%) = \frac{\|x^{(n+1)} - x^{(n)}\|_\infty}{\|x^{(n+1)}\|_\infty}$$

x_1	x_2
0	0
1.2500	-0.9167
1.0208	-0.9931
1.0017	-0.9994

c)

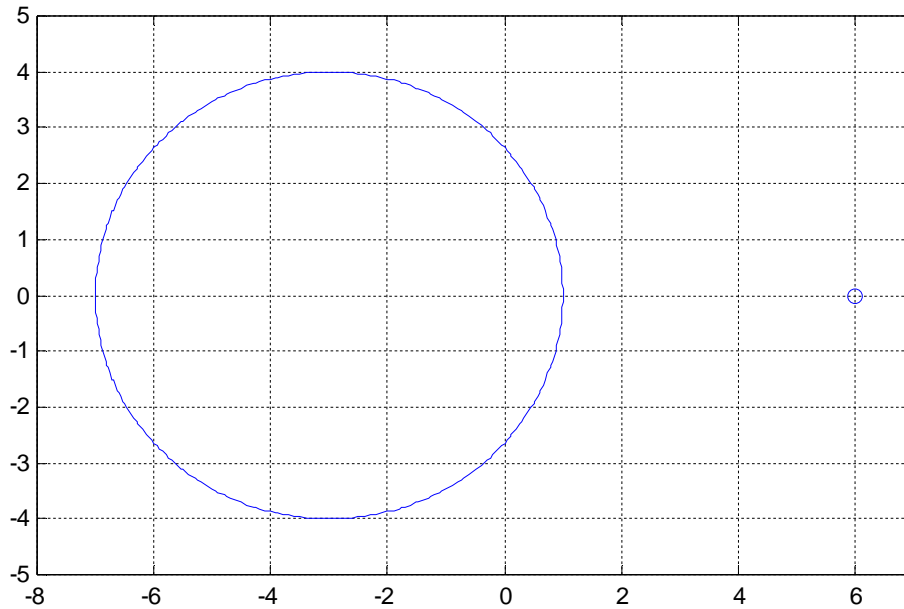
$$\delta(\%) = 1.9$$

Problema 3

a)

$$|z+3| \leq 4$$

$$|z-6| \leq 0$$



Uno de los valores propios es 6.

b)

$$x^{(0)} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$y^{(1)} = Ax^{(0)} = \begin{bmatrix} -7 \\ -6 \end{bmatrix} \quad \lambda^{(1)} = -7 \quad x^{(1)} = \begin{bmatrix} 1 \\ 0.8571 \end{bmatrix}$$

$$y^{(2)} = Ax^{(1)} = \begin{bmatrix} 0.4286 \\ 5.1429 \end{bmatrix} \quad \lambda^{(2)} = 5.1429 \quad x^{(2)} = \begin{bmatrix} 0.0833 \\ 1 \end{bmatrix}$$

$$y^{(3)} = Ax^{(2)} = \begin{bmatrix} 3.75 \\ 6 \end{bmatrix} \quad \lambda^{(3)} = 6 \quad x^{(3)} = \begin{bmatrix} 0.625 \\ 1 \end{bmatrix}$$

c)

$$x^{(0)} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$B = (A - 6.2I)^{-1} = \begin{bmatrix} -0.1087 & -2.1739 \\ 0 & -5 \end{bmatrix}$$

$$y^{(1)} = Bx^{(0)} = \begin{bmatrix} 2.0652 \\ 5 \end{bmatrix} \quad \mu^{(1)} = 5 \quad x^{(1)} = \begin{bmatrix} 0.4135 \\ 1 \end{bmatrix} \quad \lambda^{(1)} = q + \frac{1}{\mu^{(1)}} = 6.4$$

$$y^{(2)} = Bx^{(1)} = \begin{bmatrix} -2.2188 \\ -5 \end{bmatrix} \quad \mu^{(2)} = -5 \quad x^{(2)} = \begin{bmatrix} 0.4438 \\ 1 \end{bmatrix} \quad \lambda^{(2)} = q + \frac{1}{\mu^{(2)}} = 6$$

$$y^{(3)} = Bx^{(2)} = \begin{bmatrix} -2.2221 \\ -5 \end{bmatrix} \quad \mu^{(3)} = -5 \quad x^{(3)} = \begin{bmatrix} 0.4444 \\ 1 \end{bmatrix} \quad \lambda^{(3)} = q + \frac{1}{\mu^{(3)}} = 6$$

d) Error = 0 %

Problema 4

a) Localización

f	G(f)
eps	-1.1513
0.1000	1.3254
0.2000	2.5062

Existe una raíz en [eps,0.1]

b) Método de Bisección

a	x	b	err
0.0000	0.0500	0.1000	0.0500
0.0000	0.0250	0.0500	0.0250
0.0250	0.0375	0.0500	0.0125
0.0250	0.0313	0.0375	0.0062
0.0250	0.0281	0.0313	0.0031

c)

$$\frac{b-a}{2^n} < TOL \quad \frac{0.1}{2^n} < 10^{-8} \quad n = 24$$