

**Universidad Nacional de El Salvador
Facultad Multidisciplinaria de Occidente
Departamento de Ingeniería y Arquitectura**



Asignatura: Análisis Numérico.

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Estudiante:

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Encuentra raíces $x^4 - 7x^3 + 13x^2 + 23x - 78 = 0$

I	P ₀	S ₀	B ₁	B ₀	C ₃	C ₂	C ₁
1	1.5	1.5	24.125	-32.4375	-4	1.75	20.75
2	2.51706686	7.976216412	11.6395042	28.6058911	-1.96586678	12.722037352	27.97736416
3	1.574877357	7.749677557	-0.014865182	17.57083026	-3.850245286	13.99178821	-8.010186488
4	1.16578980	6.30970678	0.769855668	1.820729189	-4.668470401	13.375541935	-13.09369821
5	1.00619366	6.01734726	0.000636676	0.143819429	-4.987612675	13.985266745	-15.916280986
6	1.00000994	6.00001546	0.00061876	0.000057373	-4.999980120	13.999951396	-15.999805528

Primera iteración

1	-7	13	23	-78	$b_0 = -32.4375$
2	1.5	-8.25	9.375	36.1875	$b_1 = 24.125$
3	1.15	-8.25	9.375	1.5	
1	-5.5	6.25	24.125	-32.4375	

1	-5.5	6.25	24.125	
	1.5	-6	2.625	1.5
	1.5	-6	1.5	
2-1	-4	1.75	20.75	

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$S: b + es -$
 $S: b - es +$
 00120164569

Δr	Δs	L	S	E_{Ar}	E_{As}
1.017066086	6.476216412	2.517066086	7.976216412	40.40680901	81.194091
-0.42188729	-0.176538855	1.574877357	7.799677557	59.82616518	2263412217
-0.408993315	-1.490159950	1.165891800	6.309700777	35.0829382	23.616967
-0.159596137	-0.29735324	1.006193663	6.017347256	15.8613737	4.85851175
-0.006183723	-0.017331798	1.000009946	6.000015458	0.61836611	0.2888625
-0.000009946	-0.0000154	1	6		
	58				

$$C_2 \Delta r + C_3 \Delta s = -b_1$$

$$C_1 \Delta r + C_2 \Delta s = -b_0$$

$$\Delta r = 1.017066066$$

$$\Delta s = 6.476216412$$

$$1.75 \Delta r - 4 \Delta s = -24.125$$

$$20.75 \Delta r + 1.75 \Delta s = 32.4375$$

Iteration 2

1	-7	13	23	-78	
	2.51706686	-11.28384244	24.39635331	29.29742092	2.51706686
		7.976216412	-35.756844	17.30847018	7.976216412
			89		
1	-4.48293314	9.69237397	11.63950842	28.6058911	

b_1

b_0

1	-4.48293314	9.69237397	11.63950842	
	2.51306686	-4.948216865	32.01803063	2.51706686
		7.976216412	-15.68017489	7.976216412
1	-1.96586628	12.722037352	27.97736416	
	C_3	C_2	C_1	

$$12.722037352 \Delta r - 1.96586628 \Delta s = -11.63950842$$

$$27.97736416 \Delta r + 12.722037352 \Delta s = -28.6058911$$

Sera Traction

1	-7	13	23	-78	
	1.574783127	-8.543962809	19.301047012	-0.02344711	1.574877357
		7.799677557	-42.31593613	95.59759517	7.799677557
1	-5.42521688	12.75577476	-0.014889112	17.57414805	
	1.574877357	-6.06366412	22.03535044	$b_0 = 1.574877357$	
		7.79967757	-30.03067175	$b_0 = 7.799677557$	
1	-3.85043377	13.99258343	-8.01245214		
	C_3	C_2	C_1		

$$C_2 \Delta r + C_3 \Delta s = -b_1$$

$$C_1 \Delta r + C_2 \Delta s = -b_0$$

$$13.99258343 \Delta r + 3.85043377 \Delta s = 0.01488911$$

$$-8.01245214 \Delta r + 13.99258343 \Delta s = -17.57414805$$

$$\Delta r = -0.408993315$$

$$\Delta s = -1.490159950$$

4ta Iteracion

1	-7	13	23	-78	
	1.16578980	-6.80146274	14.58197632	0.89748989	1.1658980
		6.36970678	-36.8122065	78.92323930	6.36970078
1	-5.83421020	12.50823804	0.76985567	1.82072919	
	1.16578980	-5.44239688	15.59307035	1.6558980	
		6.36970078	-29.45633584	6.30970078	
1	-4.66842040	13.37554193	-13.09340982		

$$13.37554193 \Delta r + 4.66842040 \Delta s = -0.76985567$$

$$-13.09340982 \Delta r + 13.37554193 \Delta s = -1.82072919$$

$$\Delta r = -0.159596137 \quad \Delta s = -0.292353524$$

5ta Iteracion

1	-7	13	23	-78	
	1.00619366	-6.63092995	13.06685074	0.00003690	1.00619366
		6.01734726	-36.66681412	78.14378253	6.01734726
1	-5.99380634	12.98691730	0.00003668	0.14381943	
	1.00619366	-5.01850427	14.07188028	1.00619366	
		6.0173726	-30.01219744	6.01734726	
1	-4.98761267	13.98526029	-15.94078049		

$$13.98526029 \Delta r + 4.98761267 \Delta s = -0.00003668$$

$$-15.94078049 \Delta r + 13.98526029 \Delta s = -0.14381943$$

$$\Delta r = -0.006183723$$

$$\Delta s = -0.017331798$$

Iteracion 6

	-7	13	23	-78	
1	1.0000094	-6.00004970	13.00009498	0.00006187	1.0000994
		6.00001546	-36.0003311	77.9999550	6.00001546
1	-5.9999006	12.99996576	0.00066187	0.0005737	
	1.00000994	-5.0002982	11.0009056	1.0000994	
		6.00001546	-29.99995801	6.00001546	
1	-4.99998012	13.99995140	-15.99980558		

$$13.99995140 \Delta r - 4.999980120 \Delta s = -0.0006187$$

$$-15.99980558 \Delta r + 19.99951396 \Delta s = -0.0005737$$

$$\Delta r = -0.000669940$$

$$\Delta s = -0.000015458$$

$$x = \frac{1 \pm \sqrt{1^2 + 4(6)}}{2} = \frac{1 \pm \sqrt{1^2 + 4(6)}}{2}$$

$$= \frac{1 \pm \sqrt{25}}{2} = \frac{1 \pm 5}{2}$$

$$x = \frac{1+5}{2}$$

$$x = \frac{1-5}{2}$$

$$x = 3$$

$$x = -2$$

1	-7	13	23	-78	3
1	3	-12	3	78	
1	-4	1	26	0	-2
	-2	12			
	-6	13	0		

$$x^2 - 6x + 13 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{6 \pm \sqrt{(-6)^2 - 4(13)}}{2}$$

$$x = 3 + \frac{16i}{2}$$

$$x = 3 - \frac{16i}{2}$$

$$x = 3$$

$$x = -2$$

$$x^6 - 4x^2 - x^2 + 4 =$$

Iteration	P_0	S_0	B_1	B_0	C_3	C_2	C_1
1	1	1	5	-5	2	-1	-4
2	-0.6666	2.6666	-1.440329218	-1.20438957	-6.518518519	8.876543210	-24.74674041
3	-0.97345163	2.02794578	0.089130124	-0.399396334	-7.746822962	11.792982733	-26.61417258
4	-0.99999486	2.00075673	-0.005993745	0.008941104	-8.004458035	12.011882922	-28.032788139
5							

1er Iteración

1	0	-4	0	-1	0	4
	1	1	-2	-1	-4	-5
		1	1	-2	-1	-4
1	1	-2	-1	-4	-5	-5
	1	2	1	2	-1	1
		1	2	1	2	1
1	2	1	2	-1	-4	

$$-4r + 2s = 5$$

$$\Delta r = -1.666666667$$

$$-4\Delta r - \Delta s = 5$$

$$\Delta s = 1.666666667$$

1	0	-4	0	-1	0	4
	-0.666	0.444	0.59259259	0.79012346	1.72616461	0.96621948
		2.6666	-1.7777	-2.37037037	-3.16649383	-6.88065844
1	-0.666	-0.888	-1.18518519	-2.58624691	-1.44032922	-1.92043896
	-0.666	0.8888	-1.7777	4.34567901	-5.91769547	-0.6666
		2.666	-3.5555	7.11111111	-17.38271605	2.6666
1	-1.33333333	2.666	-6.51851852	8.87654321	-24.74074074	

Δ_r	Δ_s	r	s	F_r	F_s
-1.66666667	1.66666667	-0.66666667	2.66666667	250	62.5
-0.306784366	-0.638720883	-0.973451033	2.027945784	31.551308	31.4959546
-0.026543823	-0.027189057	-0.999999486	2.000756727	2.65439594	1.35893867
-0.000005337	-0.000756809	-1.000000193	1.999999918	0.00053365	0.03789046

$$8.87654321 \Delta_r - 6.518518519 \Delta_s = 1.444032922$$

$$-24.74074074 \Delta_r + 8.87654321 \Delta_s = 1.92043896$$

$$\Delta_r = -0.306784366$$

$$\Delta_s = -0.638720883$$

2da iteracion

1	0	-4.4	0	0	-1	-0	4
	-0.973451033	0.99760691	0.99724928	0.95092210	2.07014242	-0.08676381	-0.97345103
		2.02794578	-1.97410592	-2.67752359	-1.98101229	-4.31263252	2.02794578
1	-0.973451033	-1.62444730	-0.97685663	-2.12666149	0.08913012	-0.39939633	
	-0.973451033	1.89521383	-2.82175449	7.54115282	-10.99316571	-0.97348103	
		2.02794578	-3.94821184	5.87843141	-15.71013696	2.02794578	
1	-1.946962066	2.89871231	-7.74682296	11.29298273	-26.61417255		

$$11.29298273 \Delta_r - 7.74682296 \Delta_s = -0.0893012$$

$$-26.61417255 \Delta_r + 11.29298273 \Delta_s = 0.39939633$$

$$\Delta_r = -0.026543823$$

$$\Delta_s = -0.027189057$$

