

Avaliação AA01 – Métodos Numéricos Computacionais

Estudante: Guilherme Brizzi

Polinômio designado:

$$P(x) = x^5 - 67.1743x^4 + 1794.09x^3 - 23805.8x^2 + 156873x - 410517$$

no intervalo $I = [10, 17]$.



Método da bissecção

n	an	xn	bn	f(xn)	ERn
0	10	10.5	11	63.82760625	
1	10	10.25	10.5	35.3276082	0.0243902439
2	10	10.125	10.25	11.56005242	0.01234567901
3	10	10.0625	10.125	-3.17285925	0.006211180124
4	10.0625	10.09375	10.125	4.44600558	0.003095975232
5	10.0625	10.078125	10.09375	0.7008315856	0.001550387597
6	10.0625	10.0703125	10.078125	-1.219803396	0.0007757951901
7	10.0703125	10.07421875	10.078125	-0.2554515835	0.0003877471888
8	10.07421875	10.07617188	10.078125	0.2236963008	0.0001938360147
9	10.07421875	10.07519531	10.07617188	-0.01562578138	9.692740138e-05
10	10.07519531	10.07568359	10.07617188	0.1040981885	4.846135207e-05
11	10.07519531	10.07543945	10.07568359	0.04425194021	2.423126318e-05
12	10.07519531	10.07531738	10.07543945	0.01431701402	1.211577838e-05
13	10.07519531	10.07525635	10.07531738	-0.0006534000859	6.057925887e-06
14	10.07525635	10.07528687	10.07531738	0.006832052954	3.028953769e-06
15	10.07525635	10.07527161	10.07528687	0.003089387901	1.514479178e-06
16	10.07525635	10.07526398	10.07527161	0.001218009274	7.572401625e-07

Resultado achado: 10.075263977050781

Método de Newton

n	x_n	$f(x_n)$	$f'(x_n)$	ER_n
0	12	17.0352	-47.736	
1	12.35686275	3.117316507	-28.90749934	0.02887972072
2	12.46470039	0.2877946268	-22.80958073	0.008651442605
3	12.47731765	-0.0004152941983	-22.09983343	0.001011216499
4	12.47729886	7.310882211e-06	-22.10088936	1.506073913e-06
5	12.47729919	-1.278240234e-07	-22.10087077	2.651181412e-08

Resultado achado: 12.477299193616568

Método da Secante

n	xn	f(xn)	ERn
0	14	7.2512	
1	13	-4.6523	0.07692307692
2	13.39083463	-1.127578241	0.02918672654
3	13.51586482	0.6362218056	0.009250624308
4	13.47076507	-0.01740084449	0.003347972028
5	13.47196572	-0.0002080118284	8.912229183e-05
6	13.47198025	7.776543498e-08	1.078267395e-06
7	13.47198024	-9.313225746e-10	4.029607845e-10

Resultado achado: 13.471980244833022

Método da Falsa Posição

n	an	xn	bn	f(xn)	ERn
0	15	15.97073137	16	-1.319294836	
1	15	15.66077385	15.97073137	-6.809231456	0.01979196711
2	15	15.19314886	15.66077385	-0.8759327633	0.03077867498
3	15	15.14727967	15.19314886	0.01155124931	0.003028212883
4	15.14727967	15.14787669	15.19314886	-2.418272197e-05	3.941283766e-05
5	15.14727967	15.14787545	15.14787669	1.396983862e-09	8.233902384e-08

Resultado achado: 15.147875445074835

Método de Horner

Estimativas

k	xk	f(xk)	f'(xk)	ERk
0	16.5	52.70810625	184.408875	
1	16.21277872	14.11197795	92.24565104	0.01771573426
2	16.05836945	2.84991016	56.78807718	0.009615501376
3	16.00744171	0.2535559535	46.969634	0.003181504008
4	16.00194745	0.002768807579	45.96256323	0.0003433491257
5	16.00188612	3.422610462e-07	45.95137735	3.832927082e-06
6	16.00188611	2.328306437e-09	45.95137596	4.737562534e-10

Resultado achado: 16.001886110724858

Coeficientes b_i do Polinômio $f(x)$

k	b0,k	b1,k	b2,k	b3,k	b4,k	b5,k
0	52.70810625	24883.01261	-7999.393175	957.96405	-50.6743	1
1	14.11197795	25321.45285	-8114.065418	967.8621322	-50.96152128	1
2	2.84991016	25564.23	-8176.967807	973.2515026	-51.11593055	1
3	0.2535559543	25645.4005	-8197.912065	975.0394985	-51.16685829	1
4	0.002768807521	25654.19015	-8200.177524	975.2327035	-51.17235255	1
5	3.421446308e-07	25654.28831	-8200.202821	975.2348607	-51.17241388	1

Coeficientes c_i do Polinômio $f(x)$

k	c5,k	c4,k	c3,k	c2,k	c1,k
0	1	-34.1743	394.0881	-1496.939525	183.51045
1	1	-34.74874256	404.4884583	-1556.183549	91.39333166
2	1	-35.05756111	410.2842344	-1588.471993	55.95987889
3	1	-35.15941659	412.2271871	-1599.209398	46.14929042
4	1	-35.1704051	412.4377293	-1600.370653	45.14306407
5	1	-35.17052776	412.4400807	-1600.383619	45.1318876