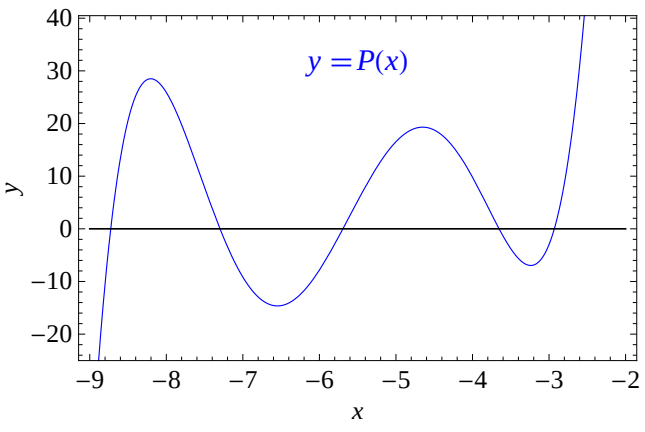
ATIVIDADE AVALIATIVA AA01 | RAÍZES DE FUNÇÕES
GABARITO
EXEMPLO DE SOLUÇÃO

GRÁFICO DA FUNÇÃO $f(x) = 3880.73 + 4044.8\,x + 1614.77\,x^2 + 308.576\,x^3 + 28.3001\,x^4 + x^5$



MÉTODO DA BISSECÇÃO | DETERMINAÇÃO DA RAÍZ z_1

k	a_k	x_k	b_k	$f(a_k)$	$f(x_k)$	$f(b_k)$	ER_k
0	−9.	−8.5	−8.	−50.0479	20.58600625	25.9076	–
1	−9.	−8.75	−8.5	−50.0479	−3.157451172	20.58600625	0.0285714
2	−8.75	−8.625	−8.5	−3.157451172	11.12809451	20.58600625	0.0144928
3	−8.75	−8.6875	−8.625	−3.157451172	4.645227243	11.12809451	0.00719424
4	−8.75	−8.71875	−8.6875	−3.157451172	0.9162208761	4.645227243	0.00358423
5	−8.75	−8.734375	−8.71875	−3.157451172	−1.076593337	0.9162208761	0.00178891
6	−8.734375	−8.7265625	−8.71875	−1.076593337	−0.06929895857	0.9162208761	0.000895255
7	−8.7265625	−8.72265625	−8.71875	−0.06929895857	0.4261680791	0.9162208761	0.000447828
8	−8.7265625	−8.724609375	−8.72265625	−0.06929895857	0.1791131742	0.4261680791	0.000223864
9	−8.7265625	−8.725585938	−8.724609375	−0.06929895857	0.05507699083	0.1791131742	0.000111919
10	−8.7265625	−8.726074219	−8.725585938	−0.06929895857	−0.007068484418	0.05507699083	0.0000559566
11	−8.726074219	−8.725830078	−8.725585938	−0.007068484418	0.02401487446	0.05507699083	0.0000279791
12	−8.726074219	−8.725952148	−8.725830078	−0.007068484418	0.008475850824	0.02401487446	0.0000139893
13	−8.726074219	−8.726013184	−8.725952148	−0.007068484418	0.0007043472142	0.008475850824	6.99462×10^{-6}
14	−8.726074219	−8.726043701	−8.726013184	−0.007068484418	−0.003181902604	0.0007043472142	3.4973×10^{-6}
15	−8.726043701	−8.726028442	−8.726013184	−0.003181902604	−0.001238736215	0.0007043472142	1.74865×10^{-6}
16	−8.726028442	−8.726020813	−8.726013184	−0.001238736215	−0.0002671841357	0.0007043472142	8.74327×10^{-7}

Raíz $z_1 = -8.726020813$

MÉTODO DE NEWTON | DETERMINAÇÃO DA RAÍZ z_2

k	x_k	$f(x_k)$	$f'(x_k)$	ER_k
0	−7.5	7.85890625	−40.65625	–
1	−7.306698693	0.3091595841	−36.76146034	0.0264554
2	−7.29828881	0.001080838098	−36.50334567	0.00115231
3	−7.298259201	$1.363878255 \times 10^{-8}$	−36.50242555	4.05703×10^{-6}
4	−7.298259201	0.	−36.50242554	5.11959×10^{-11}

Raíz $z_2 = -7.298259201$

MÉTODO DA SECANTE | DETERMINAÇÃO DA RAÍZ z_3

k	x_k	$f(x_k)$	ER_k
0	−5.5	5.30700625	–
1	−5.	16.5425	0.1
2	−5.736171474	−1.186777404	0.128338
3	−5.686893004	0.159621058	0.00866527
4	−5.692735169	−0.0008114273132	0.00102625
5	−5.692705621	$-4.613812052 \times 10^{-7}$	5.19054×10^{-6}
6	−5.692705604	$-8.185452316 \times 10^{-12}$	2.95304×10^{-9}

Raíz $z_3 = -5.692705604$

MÉTODO DA FALSA POSIÇÃO | DETERMINAÇÃO DA RAÍZ z_4

k	a_k	x_k	b_k	$f(x_k)$	ER_k
0	−4.	−3.233199172	−3.	−6.95392	–
1	−4.	−3.551249126	−3.233199172	−2.59896	0.08956
2	−4.	−3.645224499	−3.551249126	−0.188147	0.0257804
3	−4.	−3.651899679	−3.645224499	−0.0069806	0.00182787
4	−4.	−3.652147164	−3.651899679	−0.000243587	0.0000677642
5	−4.	−3.6521558	−3.652147164	-8.48017×10^{-6}	2.36456×10^{-6}
6	−4.	−3.6521561	−3.6521558	-2.95202×10^{-7}	8.2319×10^{-8}

Raíz $z_4 = -3.6521561$

MÉTODO DE HORNER | DETERMINAÇÃO DA RAÍZ z_5
Coeficientes b_i do Polinômio $f(x)$

k	$b_{5,k}$	$b_{4,k}$	$b_{3,k}$	$b_{2,k}$	$b_{1,k}$	$b_{0,k}$
0	1	26.3001	255.9758	1102.8184	1839.1632	202.4036
1	1	25.86297039	245.544589	1016.346011	1567.83304	59.71767035
2	1	25.57887157	238.9700474	964.4779123	1420.235282	15.94536935
3	1	25.42651934	235.5108457	938.0105882	1349.350914	3.261308758
4	1	25.37514179	234.3547707	929.2920895	1326.659474	0.3064809061
5	1	25.36921566	234.2217631	928.2931024	1324.080283	0.003833196805
6	1	25.36913964	234.2200574	928.2802969	1324.047249	$6.263976502 \times 10^{-7}$

Coeficientes c_i do Polinômio $f'(x)$

k	$c_{5,k}$	$c_{4,k}$	$c_{3,k}$	$c_{2,k}$	$c_{1,k}$
0	1	24.3001	207.3756	688.0672	463.0288
1	1	23.42584077	188.4527787	557.0621633	210.2003459
2	1	22.85764313	176.769179	483.4485963	104.6612154
3	1	22.55293868	170.7031573	447.4812965	63.47731397
4	1	22.45018358	168.6889219	435.8840425	51.71686551
5	1	22.43833132	168.4576092	434.5633336	50.42541393
6	1	22.43817929	168.4546434	434.546415	50.40893387

Estimativas

k	x_k	$f(x_k)$	$f'(x_k)$	ER_k
0	−2.	202.4036	463.0288	–
1	−2.437129613	59.71767035	210.2003459	0.179362
2	−2.721228433	15.94536935	104.6612154	0.104401
3	−2.873580661	3.261308758	63.47731397	0.0530183
4	−2.924958209	0.3064809061	51.71686551	0.0175652
5	−2.93088434	0.003833196805	50.42541393	0.00202196
6	−2.930960357	$6.263976502 \times 10^{-7}$	50.40893387	0.0000259359
7	−2.93096037	–	–	4.23968×10^{-9}

Raíz $z_5 = -2.93096037$