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Regula falsi

Akar-akar persamaan $2x^3 - 6x^2 + 7x - 5 = 0$ pada range $[0,2]$

$e = 0.000001$

r	a	c	b	f(a)	f(c)	f(b)	Selang Baru	Lebar
0	0,0000000000	1,6666666667	2,0000000000	-5,0000000000	-0,7407407407	1,0000000000	[c,b]	-2,0000000000
0	1,6666666667	1,8085106383	2,0000000000	-0,7407407407	-0,1344596091	1,0000000000	[c,b]	0,1914893617
1	1,8085106383	1,8312065408	2,0000000000	-0,1344596091	-0,0202250901	1,0000000000	[c,b]	0,1687934592
2	1,8312065408	1,8345527269	2,0000000000	-0,0202250901	-0,0029516212	1,0000000000	[c,b]	0,1654472731
3	1,8345527269	1,8350396274	2,0000000000	-0,0029516212	-0,0004288395	1,0000000000	[c,b]	0,1649603726
4	1,8350396274	1,8351103386	2,0000000000	-0,0004288395	-0,0000622655	1,0000000000	[c,b]	0,1648896614
5	1,8351103386	1,8351206049	2,0000000000	-0,0000622655	-0,0000090398	1,0000000000	[c,b]	0,1648793951
6	1,8351206049	1,8351220953	2,0000000000	-0,0000090398	-0,0000013124	1,0000000000	[c,b]	0,1648779047
7	1,8351220953	1,8351223117	2,0000000000	-0,0000013124	-0,0000001905	1,0000000000	[c,b]	0,1648776883

jadi Kesimpulan dari tabel hasil perhitungan akar akar dari persamaan $2x^3 - 6x^2 + 7x - 5 = 0$ menggunakan metode regula falsi diketahui $x = 1,8351223117$ karena sudah memnuhi $f(x)$ toleransi $0,000001$

Bagi Dua

Akar-akar persamaan $2x^3 - 6x^2 + 7x - 5 = 0$ pada range $[0,2]$

$e = 0.000001$

r	a	c	b	f(a)	f(c)	f(b)	Selang Baru	Lebar	f(a) * f(c)	f(b) * f(c)
0	0,0000000000	1,0000000000	2,0000000000	-5,0000000000	-2,0000000000	1,0000000000	[c,b]	-2,0000000000	10,0000000000	-2,0000000000
1	1,0000000000	1,5000000000	2,0000000000	-2,0000000000	-1,2500000000	1,0000000000	[c,b]	-1,0000000000	2,5000000000	-1,2500000000
2	1,5000000000	1,7500000000	2,0000000000	-1,2500000000	-0,4062500000	1,0000000000	[c,b]	-0,5000000000	0,5078125000	-0,4062500000
3	1,7500000000	1,8750000000	2,0000000000	-0,4062500000	0,2148437500	1,0000000000	[c,b]	-0,2500000000	-0,0872802734	0,2148437500
4	1,7500000000	1,8125000000	1,8750000000	-0,4062500000	-0,1147460938	0,2148437500	[a,c]	-0,1250000000	0,0466156006	-0,0246524811
5	1,8125000000	1,8437500000	1,8750000000	-0,1147460938	0,0451049805	0,2148437500	[c,b]	-0,0625000000	-0,0051756203	0,0096905231
6	1,8125000000	1,8281250000	1,8437500000	-0,1147460938	-0,0360336304	0,0451049805	[a,c]	-0,0312500000	0,0041347183	-0,0016252962
7	1,8281250000	1,8359375000	1,8437500000	-0,0360336304	0,0042295456	0,0451049805	[c,b]	-0,0156250000	-0,0001524059	0,0001907736
8	1,8281250000	1,8320312500	1,8359375000	-0,0360336304	-0,0159782171	0,0042295456	[a,c]	-0,0078125000	0,0005757532	-0,0000675806
9	1,8320312500	1,8339843750	1,8359375000	-0,0159782171	-0,0058934242	0,0042295456	[c,b]	-0,0039062500	0,0000941664	-0,0000249265
10	1,8339843750	1,8349609375	1,8359375000	-0,0058934242	-0,0008367170	0,0042295456	[c,b]	-0,0019531250	0,0000049311	-0,0000035389
11	1,8349609375	1,8354492188	1,8359375000	-0,0008367170	0,0016952192	0,0042295456	[c,b]	-0,0009765625	-0,0000014184	0,0000071700
12	1,8349609375	1,8352050781	1,8354492188	-0,0008367170	0,0004289524	0,0016952192	[a,c]	-0,0004882813	-0,0000003589	0,0000007272
13	1,8349609375	1,8350830078	1,8352050781	-0,0008367170	-0,0002039569	0,0004289524	[a,c]	-0,0002441406	0,0000001707	-0,0000000875
14	1,8350830078	1,8351440430	1,8352050781	-0,0002039569	0,0001124791	0,0004289524	[c,b]	-0,0001220703	-0,0000000229	0,0000000482
15	1,8350830078	1,8351135254	1,8351440430	-0,0002039569	-0,0000457436	0,0001124791	[a,c]	-0,0000610352	0,0000000093	-0,0000000051
16	1,8351135254	1,8351287842	1,8351440430	-0,0000457436	0,0000333666	0,0001124791	[c,b]	-0,0000305176	-0,0000000015	0,0000000038
17	1,8351135254	1,8351211548	1,8351287842	-0,0000457436	-0,0000061888	0,0000333666	[a,c]	-0,0000152588	0,0000000003	-0,0000000002
18	1,8351211548	1,8351249695	1,8351287842	-0,0000061888	0,0000135888	0,0000333666	[c,b]	-0,0000076294	-0,0000000001	0,0000000005
19	1,8351211548	1,8351230621	1,8351249695	-0,0000061888	0,0000037000	0,0000135888	[a,c]	-0,0000038147	0,0000000000	0,0000000001
20	1,8351211548	1,8351221085	1,8351230621	-0,0000061888	-0,0000012444	0,0000037000	[a,c]	-0,0000019073	0,0000000000	0,0000000000
21	1,8351221085	1,8351225853	1,8351230621	-0,0000012444	0,0000012278	0,0000037000	[c,b]	-0,0000009537	0,0000000000	0,0000000000

jadi Kesimpulan dari tabel hasil perhitungan akar akar dari persamaan $2x^3 - 6x^2 + 7x - 5 = 0$ menggunakan metode bagi dua diketahui $x = 1,8351225853$ karena sudah memnuhi toleransi 0,000001

Leleran Titik Tetap

Akar-akar persamaan $2x^3 - 6x^2 + 7x - 5 = 0$ pada range $[0,2]$

$e = 0.000001$

$$2x^3 - 6x^2 + 7x - 5 = 0$$

$$f(x) = 2x^3 - 6x^2 + 7x - 5$$

$$g(x) = (2x^3 - 6x^2 - 5) / -7$$

$$x = 2$$

i	x	f(x)	selisih
0	2,0000000000	1,0000000000	
1	1,8571428571	0,1166180758	0,1428571429
2	1,8404831320	0,0279376964	0,0166597251
3	1,8364920325	0,0071106366	0,0039910995
4	1,8354762273	0,0018353393	0,0010158052
5	1,8352140360	0,0004754030	0,0002621913
6	1,8351461213	0,0001232547	0,0000679147
7	1,8351285135	0,0000319630	0,0000176078
8	1,8351239473	0,0000082893	0,0000045661
9	1,8351227631	0,0000021498	0,0000011842
10	1,8351224560	0,0000005575	0,0000003071

jadi Kesimpulan dari tabel hasil perhitungan akar akar dari persamaan $2x^3 - 6x^2 + 7x - 5 = 0$

menggunakan metode lelaran titik tetap diketahui $x = 1,8351224560$ karena sudah memnuhi $f(x)$ toleransi $0,000001$

Regresi

Regresi

Tentukan persamaan regresi jika $x=100$, maka $y=?$

x	y	xy	x ²
23	1000	23.000	529
35	875	30.625	1.225
37	800	29.600	1.369
38	700	26.600	1.444
50	645	32.250	2.500
52	592	30.784	2.704
65	500	32.500	4.225
73	453	33.069	5.329
80	400	32.000	6.400
903	5965	270.428	25.725

$$\Rightarrow \begin{bmatrix} n & \sum x_i \\ \sum x_i & \sum x_i^2 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} \sum y_i \\ \sum x_i y_i \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 9 & 453 \\ 453 & 25.725 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 5965 \\ 270408 \end{bmatrix}$$

$$\Rightarrow \begin{array}{l} 9a + 453b = 5965 \\ 453a + 25725b = 270408 \end{array} \quad \begin{array}{l} \times 453 \\ \times 9 \end{array}$$

$$453a + 25725b = 270408$$

$$4077a + 231525b = 2702145$$

$$4077a + 231525b = 2433672$$

$$-26316b = 268473$$

$$b = \frac{268473}{26316}$$

$$= 10,195$$

$$= 10,195$$

$$\Rightarrow 9a + 453b = 5965$$

$$9a + 453(10,195) = 5965$$

$$9a + 4618,358 = 5965$$

$$9a = 5965 - 4618,358$$

$$a = \frac{1346,642}{9}$$

$$a = 149,627$$

$$a = 149,627$$

$$\text{maka } F(x) = a + bx$$

$$\text{jadi } y = 1169,127$$

$$= 149,627 + 10,195(100)$$

$$= 149,627 + 1019,5$$

$$= 1169,127$$

Interpolasi

Interpolasi

1. Jarak yang dibutuhkan sebuah kendaraan untuk berhenti adalah fungsi kecepatan. Data percobaan berikut ini menunjukkan hubungan antara kecepatan dan jarak yang dibutuhkan untuk menghentikan kendaraan.

Kecepatan (mil/jam)	10	20	30	40	50	60	70	80
Jarak (Feet)	12	21	45	65	90	110	148	180

Perkiraan jarak henti yang dibutuhkan bagi sebuah kendaraan yang melaju dengan kecepatan 55 mil/jam.

JAWABAN : $P_1(x) = y_0 + \frac{y_1 - y_0}{x_1 - x_0} (x - x_0)$ diambil titik $(50, 90)$ dan $(60, 110)$

$$\Rightarrow P_1(55) = 90 + \frac{110 - 90}{60 - 50} (55 - 50)$$

$$\Rightarrow P_1(55) = 90 + \frac{20}{10} (5)$$

$$\Rightarrow P_1(55) = 90 + 10$$

$$\Rightarrow P_1(55) = 100$$

Jadi Perkiraan jarak henti yang dibutuhkan bagi sebuah kendaraan yang melaju dengan kecepatan 55 mil/jam adalah 100 feet.

4. Jika $x = 25$ maka $y = ?$

x	y	$\Rightarrow a_0 + a_1(23) + a_2(23)^2 = 1000$
23	1000	$a_0 + a_1(35) + a_2(35)^2 = 875$
35	875	$a_0 + a_1(37) + a_2(37)^2 = 800$
37	800	$\Rightarrow a_0 + 23a_1 + 529a_2 = 1000$
38	700	$a_0 + 35a_1 + 1225a_2 = 875$
50	645	$a_0 + 37a_1 + 1369a_2 = 800$

$$\Rightarrow a_0 + 23a_1 + 529a_2 = 1000$$

$$a_0 + 35a_1 + 1225a_2 = 875$$

$$\hline -12a_1 - 696a_2 = 125$$

$$\Rightarrow a_0 + 35a_1 + 1225a_2 = 875$$

$$a_0 + 37a_1 + 1369a_2 = 800 \quad -$$

$$-2a_1 - 144a_2 = 75$$

$$\Rightarrow \begin{array}{l|l} -12a_1 - 696a_2 = 125 & \times 2 \\ -2a_1 - 144a_2 = 75 & \times 12 \end{array} \quad \begin{array}{l} 24a_1 - 1392a_2 = 250 \\ -24a_1 - 1728a_2 = 1050 \end{array}$$

$$-3120a_2 = -800$$

$$a_2 = \frac{-800}{-3120}$$

$$a_2 = 0,256 //$$

$$a_2 = 0,256 //$$

$$\Rightarrow -12a_1 - 696a_2 = 125$$

$$-12a_1 - 696(-0,256) = 125$$

$$-12a_1 + 178,176 = 125$$

$$-12a_1 = 125 - 178,176$$

$$-12a_1 = -53,176$$

$$a_1 = \frac{-53,176}{-12}$$

$$a_1 = -4,431 //$$

$$a_1 = -4,431 //$$

$$\Rightarrow a_0 + 23a_1 + 529a_2 = 1000$$

$$a_0 + 23(-4,431) + 529(-0,256) = 1000$$

$$a_0 - 101,913 - 135,424 = 1000$$

$$a_0 - 237,337 = 1000$$

$$a_0 = 1000 + 237,337$$

$$a_0 = 1237,337 //$$

$$\Rightarrow P_2(x) = a_0 + a_1x + a_2x^2$$

$$P_2(25) = 1237,337 - 4,431 \cdot 25 - 0,256 \cdot 625$$

$$= 1237,337 - 110,775 - 160$$

$$= 966,562 //$$