

LAMPIRAN 1

Perhitungan Volume BBM didalam UT untuk Peralite ketinggian 0 – 90 cm
(Berdasarkan Buku Ukur UT dari Metrologi Kab. Semarang)

Tinggi (cm)	Volume (liter)	Selisih	Tinggi (cm)	Volume (l)	Selisih	Tinggi (cm)	Volume (liter)	Selisih
1	237,1	0	31	2352,7	90,9	61	5480,0	111,1
2	294,3	57,2	32	2446,7	94,0	62	5591,1	111,1
3	351,4	57,1	33	2541,9	95,2	63	5702,2	111,1
4	409,4	58,0	34	2637,1	95,2	64	5813,3	111,1
5	468,2	58,8	35	2732,4	95,3	65	5924,4	111,1
6	527,1	58,9	36	2830,0	97,6	66	6035,6	111,2
7	586,1	59,0	37	2930,0	100,0	67	6146,7	111,1
8	646,7	60,6	38	3030,0	100,0	68	6262,4	115,7
9	707,3	60,6	39	3130,0	100,0	69	6380,0	117,6
10	767,9	60,6	40	3230,0	100,0	70	6497,6	117,6
11	831,6	63,7	41	3330,0	100,0	71	6615,3	117,7
12	896,1	64,5	42	3430,0	100,0	72	6732,9	117,6
13	960,6	64,5	43	3530,0	100,0	73	6850,6	117,7
14	1026,7	66,1	44	3630,0	100,0	74	6968,2	117,6
15	1093,3	66,6	45	3730,0	100,0	75	7085,9	117,7
16	1160,0	66,7	46	3832,6	102,6	76	7203,5	117,6
17	1228,3	68,3	47	3937,9	105,3	77	7321,2	117,7
18	1297,2	68,9	48	4043,2	105,3	78	7438,8	117,6
19	1366,2	69,0	49	4148,4	105,2	79	7556,5	117,7
20	1439,3	73,1	50	4257,8	109,4	80	7674,1	117,6
21	1513,3	74,0	51	4368,9	111,1	81	7791,8	117,7
22	1588,0	74,7	52	4480,0	111,1	82	7909,4	117,6
23	1668,0	80,0	53	4591,1	111,1	83	8027,1	117,7
24	1748,0	80,0	54	4702,2	111,1	84	8144,7	117,6
25	1830,0	82,0	55	4813,3	111,1	85	8262,4	117,7
26	1913,3	83,3	56	4924,4	111,1	86	8380,0	117,6
27	1997,4	84,1	57	5035,6	111,2	87	8497,6	117,6
28	2084,3	86,9	58	5146,7	111,1	88	8615,3	117,7
29	2171,3	87,0	59	5257,8	111,1	89	8732,9	117,6
30	2261,8	90,5	60	5368,9	111,1	90	8855,0	122,1

Perhitungan Volume BBM didalam UT untuk Peralite ketinggian 91 – 180 cm
(Berdasarkan Buku Ukur UT dari Metrologi Kab. Semarang)

Tinggi (cm)	Volume (l)	Selisih	Tinggi (cm)	Volume (l)	Selisih	Tinggi (cm)	Volume (l)	Selisih
91	8980,0	125,0	121	12730	125,0	151	16235,6	111,2
92	9105,0	125,0	122	12855	125,0	152	16346,7	111,1
93	9230,0	125,0	123	12980	125,0	153	16457,8	111,1
94	9355,0	125,0	124	13105	125,0	154	16568,9	111,1
95	9480,0	125,0	125	13227,1	122,1	155	16680,0	111,1
96	9605,0	125,0	126	13344,7	117,6	156	16791,1	111,1
97	9730,0	125,0	127	13462,4	117,7	157	16902,2	111,1
98	9855,0	125,0	128	13580,0	117,6	158	17013,3	111,1
99	9980,0	125,0	129	13697,6	117,6	159	17124,4	111,1
100	10105,0	125,0	130	13815,3	117,7	160	17232,6	108,2
101	10230,0	125,0	131	13932,9	117,6	161	17337,9	105,3
102	10355,0	125,0	132	14050,6	117,7	162	17443,2	105,3
103	10480,0	125,0	133	14168,2	117,6	163	17548,4	105,2
104	10605,0	125,0	134	14285,9	117,7	164	17653,7	105,3
105	10730,0	125,0	135	14403,5	117,6	165	17758,9	105,2
106	10855,0	125,0	136	14521,2	117,7	166	17864,2	105,3
107	10980,0	125,0	137	14638,8	117,6	167	17969,5	105,3
108	11105,0	125,0	138	14756,5	117,7	168	18065,7	96,2
109	11230,0	125,0	139	14874,1	117,6	169	18161,0	95,3
110	11355,0	125,0	140	14991,8	117,7	170	18256,2	95,2
111	11480,0	125,0	141	15109,4	117,6	171	18351,4	95,2
112	11605,0	125,0	142	15227,1	117,7	172	18446,7	95,3
113	11730,0	125,0	143	15344,7	117,6	173	18541,9	95,2
114	11855,0	125,0	144	15457,8	113,1	174	18637,1	95,2
115	11980,0	125,0	145	15568,9	111,1	175	18732,4	95,3
116	12105,0	125,0	146	15680,0	111,1	176	18825,5	93,1
117	12230,0	125,0	147	15791,1	111,1	177	18916,4	90,9
118	12355,0	125,0	148	15902,2	111,1	178	19007,3	90,9
119	12480,0	125,0	149	16013,3	111,1	179	19098,2	90,9
120	12605,0	125,0	150	16124,4	111,1	180	19189,1	90,9

Perhitungan Volume BBM didalam UT untuk Pertalite ketinggian 181 – 222,3 cm
(Berdasarkan Buku Ukur UT dari Metrologi Kab. Semarang)

Tinggi (cm)	Volume (l)	Selisih	Tinggi (cm)	Volume (l)	Selisih
181	19280,0	90,9	211	21294,3	35,7
182	19370,9	90,9	212	21330	35,7
183	19458,3	87,4	213	21365,7	35,7
184	19545,2	86,9	214	21387,1	21,4
185	19632,2	87,0	215	21399,1	12,0
186	19719,1	86,9	216	21411,0	11,9
187	19804,0	84,9	217	21422,9	11,9
188	19884,0	80,0	218	21434,8	11,9
189	19964,0	80,0	219	21446,7	11,9
190	20044,0	80,0	220	21458,6	11,9
191	20124,0	80,0	221	21470,5	11,9
192	20202,2	78,2	222	21482,4	11,9
193	20276,3	74,1	222,3	21486,0	3,6
194	20350,4	74,1			
195	20420,0	69,6			
196	20486,7	66,7			
197	20553,3	66,6			
198	20617,5	64,2			
199	20680,0	62,5			
200	20742,5	62,5			
201	20802,9	60,4			
202	20860,0	57,1			
203	20917,1	57,1			
204	20974,3	57,2			
205	21028,6	54,3			
206	21082,7	54,1			
207	21136,8	54,1			
208	21187,1	50,3			
209	21222,9	35,8			
210	21258,6	35,7			

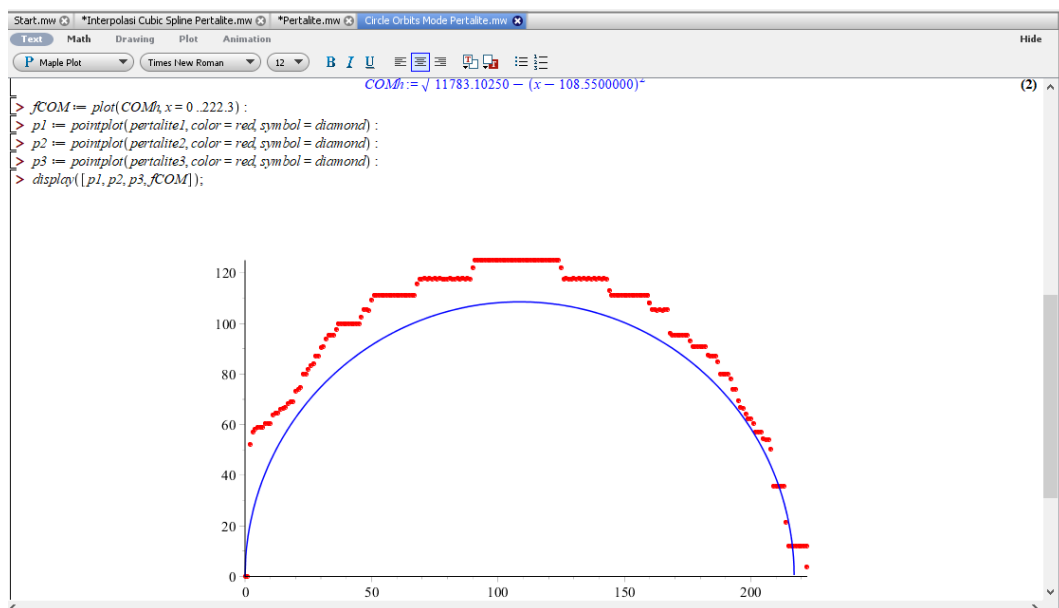
LAMPIRAN 2

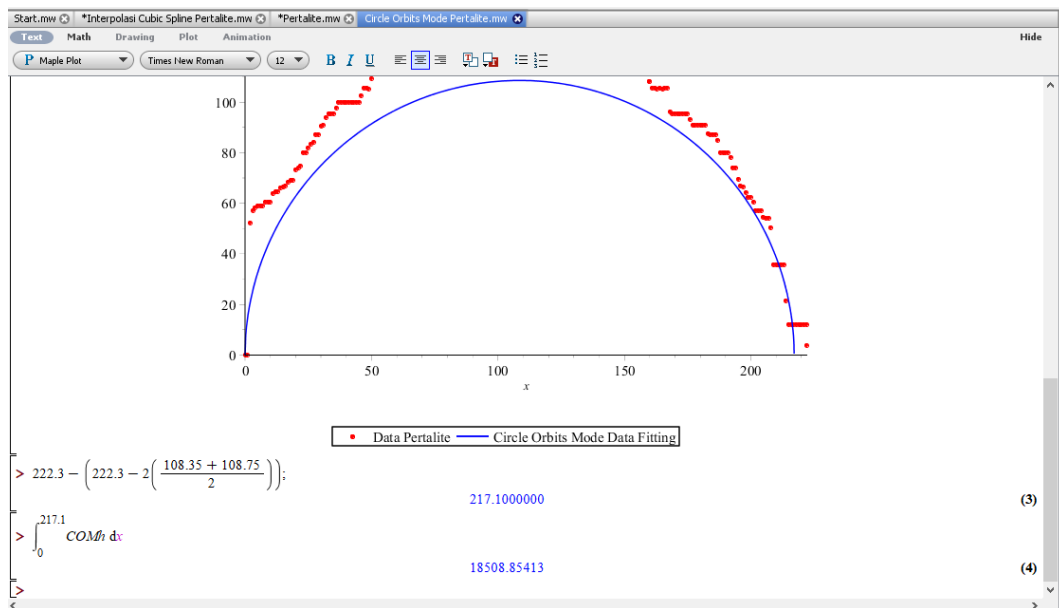
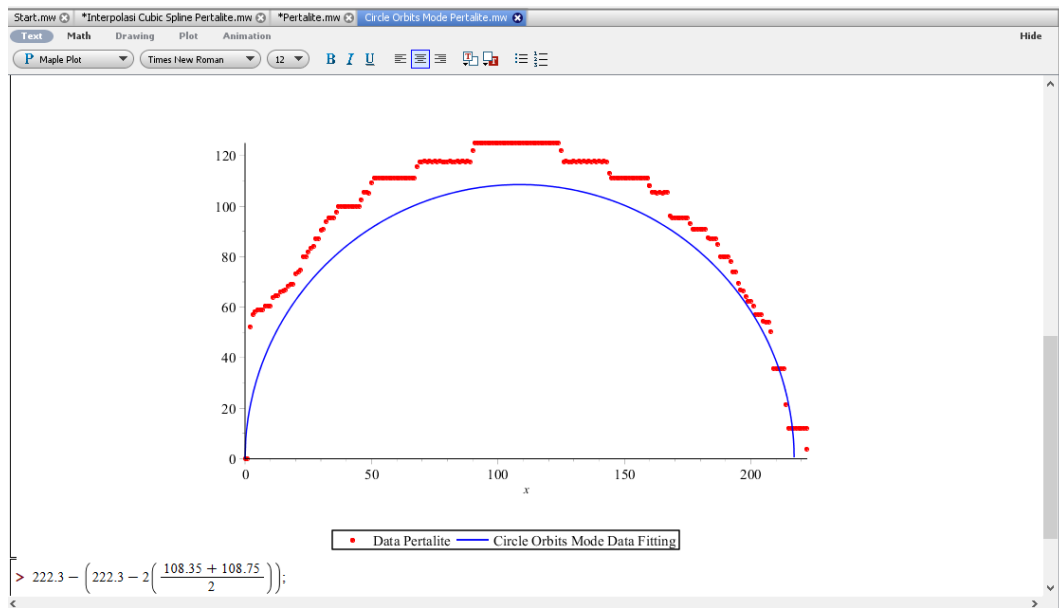
LISTING PROGRAM MAPLE 2015 UNTUK KALIBRASI MENGGUNAKAN CIRCLE ORBITS MODE

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Start.mw *Interpolasi Cubic Spline Pertalite.mw *Pertalite.mw Circle Orbits Mode Pertalite.mw
Text Math Drawing Plot Animation
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> restart;
> with(linalg):
> with(plots):
> with(Student[NumericalAnalysis]):
> with(CurveFitting):
> pertalite1 := [[0, 0], [1, 0], [2, 52.2], [3, 57.1], [4, 58], [5, 58.8], [6, 58.9], [7, 59], [8, 60.6], [9, 60.6], [10, 60.6], [11, 63.7], [12, 64.5], [13, 64.5], [14, 66.1], [15,
66.6], [16, 66.7], [17, 68.3], [18, 68.9], [19, 69], [20, 73.1], [21, 74.0], [22, 74.7], [23, 80.0], [24, 80.0], [25, 82], [26, 83.3], [27, 84.1], [28, 86.9], [29, 87.0], [30,
90.5], [31, 90.9], [32, 94.0], [33, 95.2], [34, 95.2], [35, 95.3], [36, 97.6], [37, 100.0], [38, 100.0], [39, 100.0], [40, 100.0], [41, 100.0], [42, 100.0], [43, 100.0], [44,
100.0], [45, 100.0], [46, 102.6], [47, 105.3], [48, 105.3], [49, 105.2], [50, 109.4], [51, 111.1], [52, 111.1], [53, 111.1], [54, 111.1], [55, 111.1], [56, 111.1], [57,
111.2], [58, 111.1], [59, 111.1], [60, 111.1], [61, 111.1], [62, 111.1], [63, 111.1], [64, 111.1], [65, 111.1], [66, 111.2], [67, 111.1], [68, 115.7], [69, 117.6], [70,
117.6], [71, 117.7], [72, 117.6], [73, 117.7], [74, 117.6], [75, 117.7], [76, 117.6], [77, 117.7], [78, 117.6], [79, 117.6], [80, 117.6], [81, 117.7], [82, 117.6], [83,
117.6], [84, 117.7], [85, 117.6], [86, 117.7]]];
> pertalite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
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[138, 117.7], [139, 117.6], [140, 117.7], [141, 117.6], [142, 117.7], [143, 117.6], [144, 113.1], [145, 111.1], [146, 111.1], [147, 111.1], [148, 111.1], [149, 111.1],
[150, 111.1], [151, 111.2], [152, 111.1], [153, 111.1], [154, 111.1], [155, 111.1], [156, 111.1], [157, 111.1], [158, 111.1], [159, 111.1], [160, 108.2]]];
> pertalite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [222.3, 3.6]]];
> COM :=  $\sqrt{\left(\frac{108.35 + 108.75}{2}\right)^2 - (x - 111.15)^2}$ ;
COM :=  $\sqrt{11783.10250 - (x - 111.15)^2}$  (1)
> COMfit :=  $\sqrt{\left(\frac{108.35 + 108.75}{2}\right)^2 - \left(x - \left(\frac{108.35 + 108.75}{2}\right)\right)^2}$ ;
COMfit :=  $\sqrt{11783.10250 - (x - 108.5500000)^2}$ 

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LAMPIRAN 3

LISTING PROGRAM MAPLE 2015 UNTUK KALIBRASI MENGGUNAKAN ELIPS ORBITS MODE

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Start.mw *Elips Orbits Mode Perkalite.mw
Text Math Drawing Plot Animation
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> restart;
> with(linalg):
> with(plots):
> with(Student[NumericalAnalysis]):
> with(CurveFitting):
> pertalite1 := [[0, 0], [1, 0], [2, 52.2], [3, 57.1], [4, 58], [5, 58.8], [6, 58.9], [7, 59], [8, 60.6], [9, 60.6], [10, 60.6], [11, 63.7], [12, 64.5], [13, 64.5], [14, 66.1], [15,
66.6], [16, 66.7], [17, 68.3], [18, 68.9], [19, 69], [20, 73.1], [21, 74.0], [22, 74.7], [23, 80.0], [24, 80.0], [25, 82], [26, 83.3], [27, 84.1], [28, 86.9], [29, 87.0], [30,
90.5], [31, 90.9], [32, 94.0], [33, 95.2], [34, 95.2], [35, 95.3], [36, 97.6], [37, 100.0], [38, 100.0], [39, 100.0], [40, 100.0], [41, 100.0], [42, 100.0], [43, 100.0], [44,
100.0], [45, 100.0], [46, 102.6], [47, 105.3], [48, 105.3], [49, 105.2], [50, 109.4], [51, 111.1], [52, 111.1], [53, 111.1], [54, 111.1], [55, 111.1], [56, 111.1], [57,
111.2], [58, 111.1], [59, 111.1], [60, 111.1], [61, 111.1], [62, 111.1], [63, 111.1], [64, 111.1], [65, 111.1], [66, 111.2], [67, 111.1], [68, 115.7], [69, 117.6], [70,
117.6], [71, 117.7], [72, 117.6], [73, 117.7], [74, 117.6], [75, 117.7], [76, 117.6], [77, 117.7], [78, 117.6], [79, 117.6], [80, 117.6], [81, 117.7], [82, 117.6], [83,
117.6], [84, 117.7], [85, 117.6], [86, 117.7]]:
> pertalite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
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> pertalite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
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[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> EOMh := 125 * sqrt(0.93 - ((x - (111.15 * sqrt(0.93)))^2) / (111.15)^2);
EOMh := 125 * sqrt(0.93 - 0.00008094332975 (x - 107.1891782)^2)
> fEOM := plot(EOMh, x = 0 .. 223.3 * sqrt(0.93)):
> p1 := pointplot(pertalite1, color = red, symbol = solidcircle):
> p2 := pointplot(pertalite2, color = red, symbol = solidcircle):

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Start.mw *Elips Orbits Mode Perkalite.mw
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> with(Student[NumericalAnalysis]):
> with(CurveFitting):
> pertalite1 := [[0, 0], [1, 0], [2, 52.2], [3, 57.1], [4, 58], [5, 58.8], [6, 58.9], [7, 59], [8, 60.6], [9, 60.6], [10, 60.6], [11, 63.7], [12, 64.5], [13, 64.5], [14, 66.1], [15,
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117.6], [84, 117.7], [85, 117.6], [86, 117.7]]:
> pertalite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
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> pertalite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> EOMh := 125 * sqrt(0.93 - ((x - (111.15 * sqrt(0.93)))^2) / (111.15)^2);
EOMh := 125 * sqrt(0.93 - 0.00008094332975 (x - 107.1891782)^2)
> fEOM := plot(EOMh, x = 0 .. 223.3 * sqrt(0.93)):
> p1 := pointplot(pertalite1, color = red, symbol = solidcircle):
> p2 := pointplot(pertalite2, color = red, symbol = solidcircle):
> p3 := pointplot(pertalite3, color = red, symbol = solidcircle):
> display(p1, p2, p3, fEOM);

```


LAMPIRAN 4

LISTING PROGRAM MAPLE 2015 UNTUK KALIBRASI MENGGUNAKAN LEAST SQUARE DATA FITTING UNTUK $n = 2$ dan $m = 223$

```

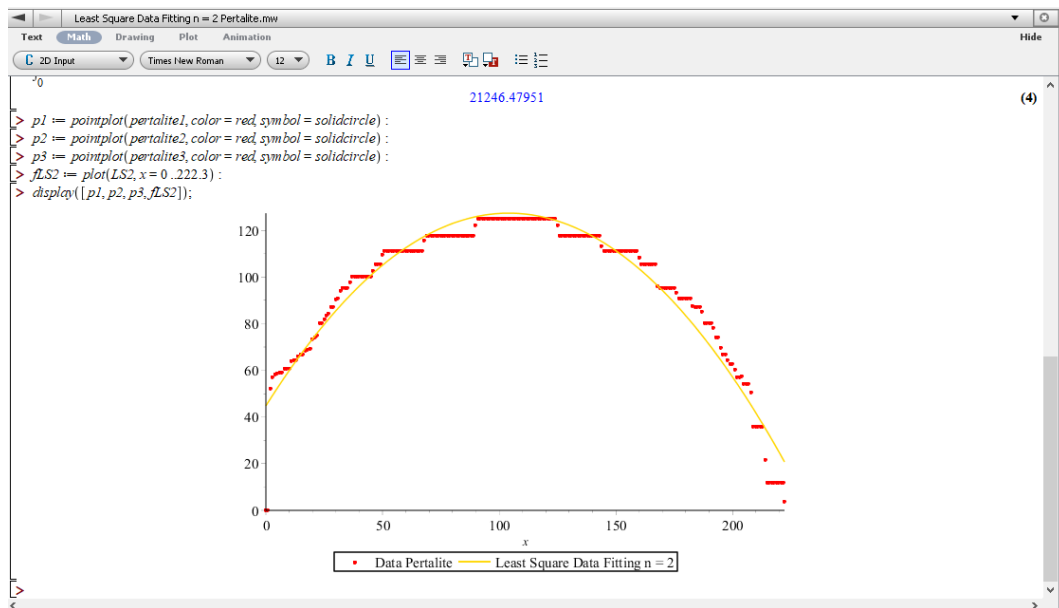
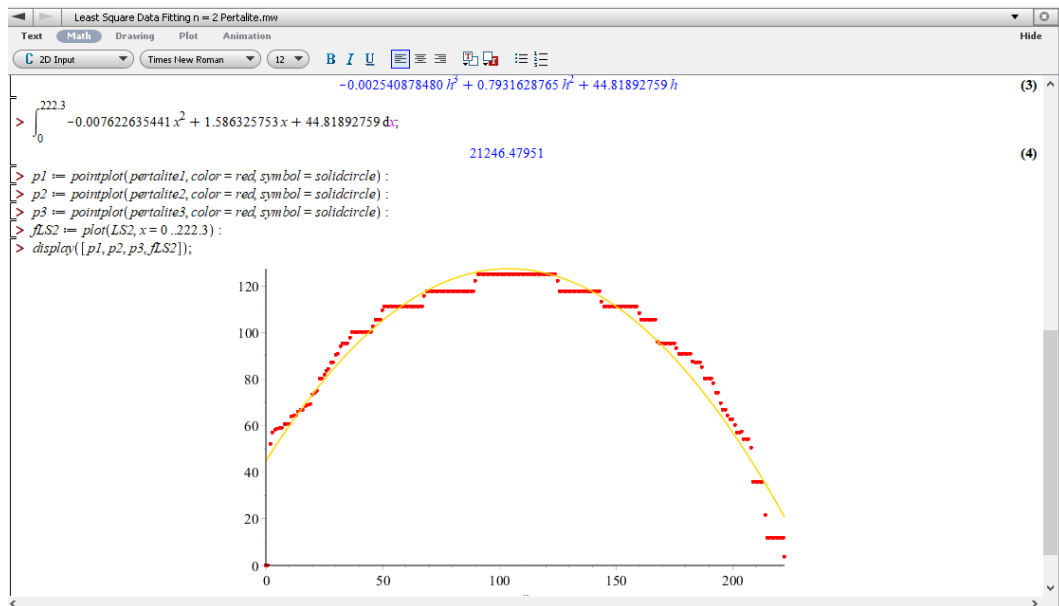
Least Square Data Fitting n = 2 Pertalite.mw
Text Math Drawing Plot Animation
C 2D Input Times New Roman 12 B I U
> restart;
> with(linalg):
> with(plots):
> with(Student[NumericalAnalysis]):
> with(CurveFitting):
> pertalite1 := [[0, 0], [1, 0], [2, 52.2], [3, 57.1], [4, 58], [5, 58.8], [6, 58.9], [7, 59], [8, 60.6], [9, 60.6], [10, 60.6], [11, 63.7], [12, 64.5], [13, 64.5], [14, 66.1], [15,
66.6], [16, 66.7], [17, 68.3], [18, 68.9], [19, 69], [20, 73.1], [21, 74.0], [22, 74.7], [23, 80.0], [24, 80.0], [25, 82], [26, 83.3], [27, 84.1], [28, 86.9], [29, 87.0], [30,
90.5], [31, 90.9], [32, 94.0], [33, 95.2], [34, 95.2], [35, 95.3], [36, 97.6], [37, 100.0], [38, 100.0], [39, 100.0], [40, 100.0], [41, 100.0], [42, 100.0], [43, 100.0], [44,
100.0], [45, 100.0], [46, 102.6], [47, 105.3], [48, 105.3], [49, 105.2], [50, 109.4], [51, 111.1], [52, 111.1], [53, 111.1], [54, 111.1], [55, 111.1], [56, 111.1], [57,
111.2], [58, 111.1], [59, 111.1], [60, 111.1], [61, 111.1], [62, 111.1], [63, 111.1], [64, 111.1], [65, 111.1], [66, 111.2], [67, 111.1], [68, 115.7], [69, 117.6], [70,
117.6], [71, 117.7], [72, 117.6], [73, 117.7], [74, 117.6], [75, 117.7], [76, 117.6], [77, 117.7], [78, 117.6], [79, 117.6], [80, 117.6], [81, 117.7], [82, 117.6], [83,
117.6], [84, 117.7], [85, 117.6], [86, 117.7]]:
> pertalite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
125], [98, 125], [99, 125], [100, 125], [101, 125], [102, 125], [103, 125], [104, 125], [105, 125], [106, 125], [107, 125], [108, 125], [109, 125], [110, 125], [111, 125],
[112, 125], [113, 125], [114, 125], [115, 125], [116, 125], [117, 125], [118, 125], [119, 125], [120, 125], [121, 125], [122, 125], [123, 125], [124, 125], [125, 122.1],
[126, 117.6], [127, 117.7], [128, 117.6], [129, 117.6], [130, 117.7], [131, 117.6], [132, 117.7], [133, 117.6], [134, 117.7], [135, 117.6], [136, 117.7], [137, 117.6],
[138, 117.7], [139, 117.6], [140, 117.7], [141, 117.6], [142, 117.7], [143, 117.6], [144, 113.1], [145, 111.1], [146, 111.1], [147, 111.1], [148, 111.1], [149, 111.1],
[150, 111.1], [151, 111.2], [152, 111.1], [153, 111.1], [154, 111.1], [155, 111.1], [156, 111.1], [157, 111.1], [158, 111.1], [159, 111.1], [160, 108.2]]:
> pertalite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> solve({223 a1 + 24975.30 a2 + 3721112.29 a3 = 21248.9, 24975.30 a1 + 3721112.29 a2 + 623696472.57 a3 = 2268051.58, 3721112.29 a1 + 623696472.57 a2
+ 111503893813.94 a3 = 306208505.74}, {a1, a2, a3});
a1 = 44.81892759, a2 = 1.586325753, a3 = -0.007622635441 (1)
> LS2 := -0.007622635441 x^2 + 1.586325753 x + 44.81892759;
LS2 := -0.007622635441 x^2 + 1.586325753 x + 44.81892759 (2)

```

```

Least Square Data Fitting n = 2 Pertalite.mw
Text Math Drawing Plot Animation
C 2D Input Times New Roman 12 B I U
> pertalite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
125], [98, 125], [99, 125], [100, 125], [101, 125], [102, 125], [103, 125], [104, 125], [105, 125], [106, 125], [107, 125], [108, 125], [109, 125], [110, 125], [111, 125],
[112, 125], [113, 125], [114, 125], [115, 125], [116, 125], [117, 125], [118, 125], [119, 125], [120, 125], [121, 125], [122, 125], [123, 125], [124, 125], [125, 122.1],
[126, 117.6], [127, 117.7], [128, 117.6], [129, 117.6], [130, 117.7], [131, 117.6], [132, 117.7], [133, 117.6], [134, 117.7], [135, 117.6], [136, 117.7], [137, 117.6],
[138, 117.7], [139, 117.6], [140, 117.7], [141, 117.6], [142, 117.7], [143, 117.6], [144, 113.1], [145, 111.1], [146, 111.1], [147, 111.1], [148, 111.1], [149, 111.1],
[150, 111.1], [151, 111.2], [152, 111.1], [153, 111.1], [154, 111.1], [155, 111.1], [156, 111.1], [157, 111.1], [158, 111.1], [159, 111.1], [160, 108.2]]:
> pertalite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> solve({223 a1 + 24975.30 a2 + 3721112.29 a3 = 21248.9, 24975.30 a1 + 3721112.29 a2 + 623696472.57 a3 = 2268051.58, 3721112.29 a1 + 623696472.57 a2
+ 111503893813.94 a3 = 306208505.74}, {a1, a2, a3});
a1 = 44.81892759, a2 = 1.586325753, a3 = -0.007622635441 (1)
> LS2 := -0.007622635441 x^2 + 1.586325753 x + 44.81892759;
LS2 := -0.007622635441 x^2 + 1.586325753 x + 44.81892759 (2)
> ∫₀ᵃ -0.007622635441 x^2 + 1.586325753 x + 44.81892759 dx;
-0.002540878480 h^3 + 0.7931628765 h^2 + 44.81892759 h (3)
> ∫₀²²².³ -0.007622635441 x^2 + 1.586325753 x + 44.81892759 dx;
21246.47951 (4)

```



LAMPIRAN 5

LISTING PROGRAM MAPLE 2015 UNTUK KALIBRASI MENGGUNAKAN
LEAST SQUARE DATA FITTING UNTUK $n = 3$ dan $m = 223$

```

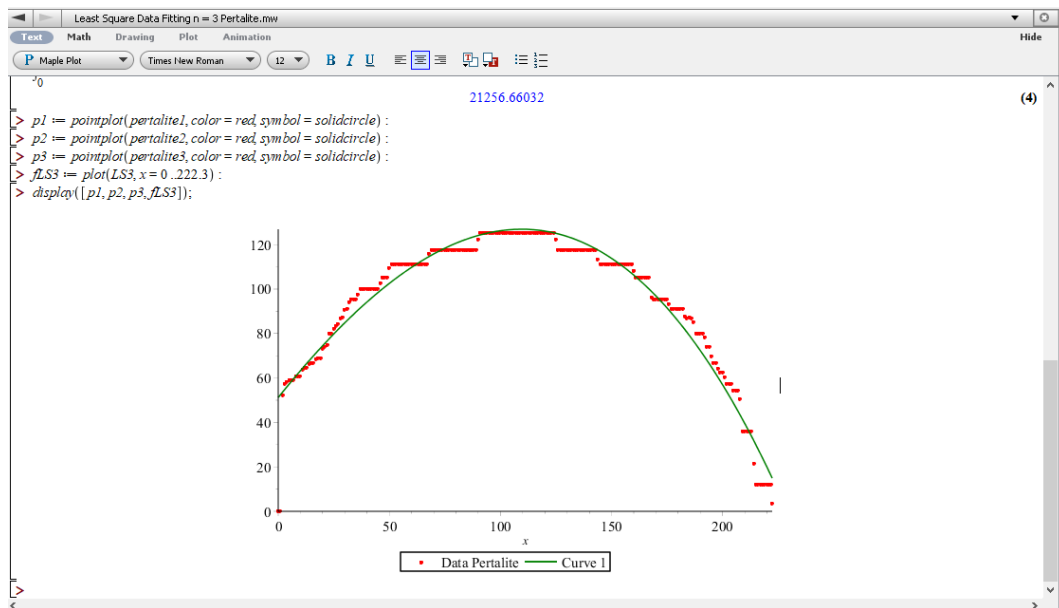
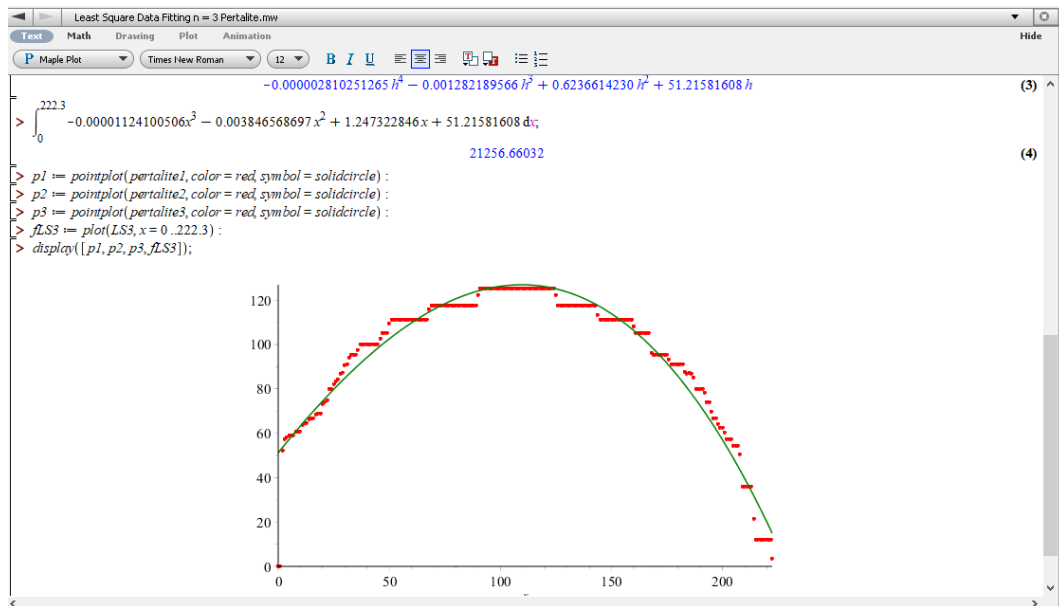
Least Square Data Fitting n = 3 Peralite.mw
Text Math Drawing Plot Animation
P Maple Plot Times New Roman 12 B I U
> restart;
> with(linalg):
> with(plots):
> with(Student[NumericalAnalysis]):
> with(CurveFitting):
> pertalite1 := [[0, 0], [1, 0], [2, 52.2], [3, 57.1], [4, 58], [5, 58.8], [6, 58.9], [7, 59], [8, 60.6], [9, 60.6], [10, 60.6], [11, 63.7], [12, 64.5], [13, 64.5], [14, 66.1], [15,
66.6], [16, 66.7], [17, 68.3], [18, 68.9], [19, 69], [20, 73.1], [21, 74.0], [22, 74.7], [23, 80.0], [24, 80.0], [25, 82], [26, 83.3], [27, 84.1], [28, 86.9], [29, 87.0], [30,
90.5], [31, 90.9], [32, 94.0], [33, 95.2], [34, 95.2], [35, 95.3], [36, 97.6], [37, 100.0], [38, 100.0], [39, 100.0], [40, 100.0], [41, 100.0], [42, 100.0], [43, 100.0], [44,
100.0], [45, 100.0], [46, 102.6], [47, 105.3], [48, 105.3], [49, 105.2], [50, 109.4], [51, 111.1], [52, 111.1], [53, 111.1], [54, 111.1], [55, 111.1], [56, 111.1], [57,
111.2], [58, 111.1], [59, 111.1], [60, 111.1], [61, 111.1], [62, 111.1], [63, 111.1], [64, 111.1], [65, 111.1], [66, 111.2], [67, 111.1], [68, 115.7], [69, 117.6], [70,
117.6], [71, 117.7], [72, 117.6], [73, 117.7], [74, 117.6], [75, 117.7], [76, 117.6], [77, 117.7], [78, 117.6], [79, 117.6], [80, 117.6], [81, 117.7], [82, 117.6], [83,
117.6], [84, 117.7], [85, 117.6], [86, 117.7]]:
> pertalite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
125], [98, 125], [99, 125], [100, 125], [101, 125], [102, 125], [103, 125], [104, 125], [105, 125], [106, 125], [107, 125], [108, 125], [109, 125], [110, 125], [111, 125],
[112, 125], [113, 125], [114, 125], [115, 125], [116, 125], [117, 125], [118, 125], [119, 125], [120, 125], [121, 125], [122, 125], [123, 125], [124, 125], [125, 122.1],
[126, 117.6], [127, 117.7], [128, 117.6], [129, 117.6], [130, 117.7], [131, 117.6], [132, 117.7], [133, 117.6], [134, 117.7], [135, 117.6], [136, 117.7], [137, 117.6],
[138, 117.7], [139, 117.6], [140, 117.7], [141, 117.6], [142, 117.7], [143, 117.6], [144, 113.1], [145, 111.1], [146, 111.1], [147, 111.1], [148, 111.1], [149, 111.1],
[150, 111.1], [151, 111.2], [152, 111.1], [153, 111.1], [154, 111.1], [155, 111.1], [156, 111.1], [157, 111.1], [158, 111.1], [159, 111.1], [160, 108.2]]:
> pertalite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> solve([223 a1 + 24975.30 a2 + 3721112.29 a3 + 623696472.57 a4 = 21248.9, 24975.30 a1 + 3721112.29 a2 + 623696472.57 a3 + 111503893813.94 a4 = 2268051.58,
3721112.29 a1 + 623696472.57 a2 + 111503893813.94 a3 + 20764581742907.90 a4 = 306208505.74, 623696472.57 a1 + 111503893813.94 a2
+ 20764581742907.90 a3 + 3977210419661420 a4 = 46444245383.14], {a1, a2, a3, a4});
(a1 = 51.21581608, a2 = 1.247322846, a3 = -0.003846568697, a4 = -0.00001124100506) (1)
> LS3 := -0.00001124100506x^3 - 0.003846568697x^2 + 1.247322846x + 51.21581608;
LS3 := -0.00001124100506x^3 - 0.003846568697x^2 + 1.247322846x + 51.21581608 (2)

```

```

Least Square Data Fitting n = 3 Peralite.mw
Text Math Drawing Plot Animation
P Maple Plot Times New Roman 12 B I U
> pertalite1 := [[126, 117.6], [127, 117.7], [128, 117.6], [129, 117.6], [130, 117.7], [131, 117.6], [132, 117.7], [133, 117.6], [134, 117.7], [135, 117.6], [136, 117.7], [137, 117.6],
[138, 117.7], [139, 117.6], [140, 117.7], [141, 117.6], [142, 117.7], [143, 117.6], [144, 113.1], [145, 111.1], [146, 111.1], [147, 111.1], [148, 111.1], [149, 111.1],
[150, 111.1], [151, 111.2], [152, 111.1], [153, 111.1], [154, 111.1], [155, 111.1], [156, 111.1], [157, 111.1], [158, 111.1], [159, 111.1], [160, 108.2]]:
> pertalite2 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> solve([223 a1 + 24975.30 a2 + 3721112.29 a3 + 623696472.57 a4 = 21248.9, 24975.30 a1 + 3721112.29 a2 + 623696472.57 a3 + 111503893813.94 a4 = 2268051.58,
3721112.29 a1 + 623696472.57 a2 + 111503893813.94 a3 + 20764581742907.90 a4 = 306208505.74, 623696472.57 a1 + 111503893813.94 a2
+ 20764581742907.90 a3 + 3977210419661420 a4 = 46444245383.14], {a1, a2, a3, a4});
(a1 = 51.21581608, a2 = 1.247322846, a3 = -0.003846568697, a4 = -0.00001124100506) (1)
> LS3 := -0.00001124100506x^3 - 0.003846568697x^2 + 1.247322846x + 51.21581608;
LS3 := -0.00001124100506x^3 - 0.003846568697x^2 + 1.247322846x + 51.21581608 (2)
> ∫₀ʰ -0.00001124100506x³ - 0.003846568697x² + 1.247322846x + 51.21581608 dx;
-0.000002810251265 h⁴ - 0.001282189566 h³ + 0.6236614230 h² + 51.21581608 h (3)
> ∫₀²²²·³ -0.00001124100506x³ - 0.003846568697x² + 1.247322846x + 51.21581608 dx;
21256.66032 (4)
> p1 := pointplot(pertalite1, color = red, symbol = solidcircle):
> p2 := pointplot(pertalite2, color = red, symbol = solidcircle):
> p3 := pointplot(pertalite3, color = red, symbol = solidcircle):
> fLS3 := plot(LS3, x = 0..222.3):
> display([p1, p2, p3, fLS3]);

```



LAMPIRAN 6

LISTING PROGRAM MAPLE 2015 UNTUK KALIBRASI MENGGUNAKAN INTERPOLASI CUBIC SPLINE

```

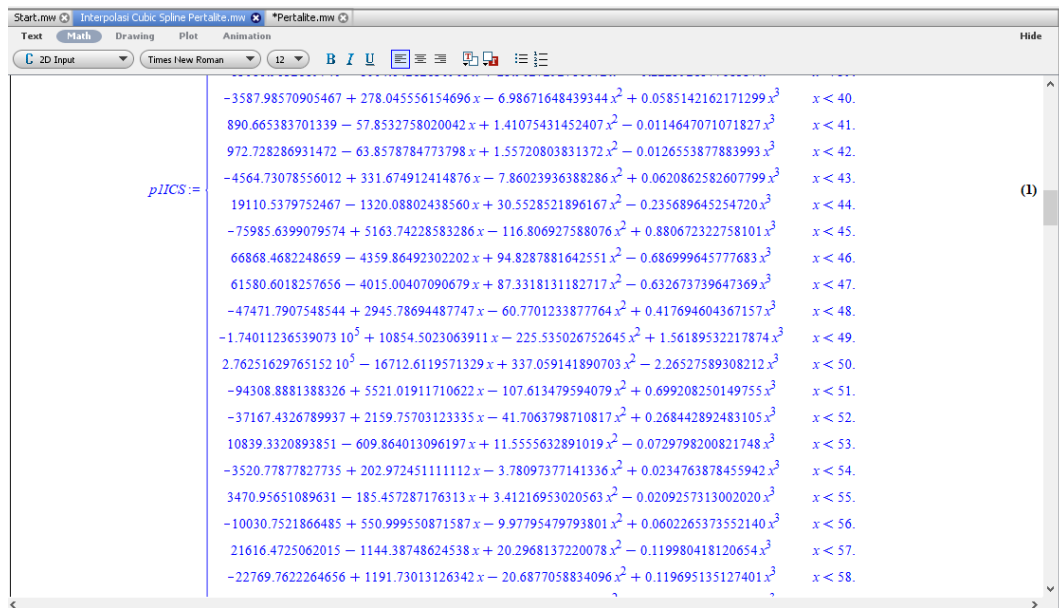
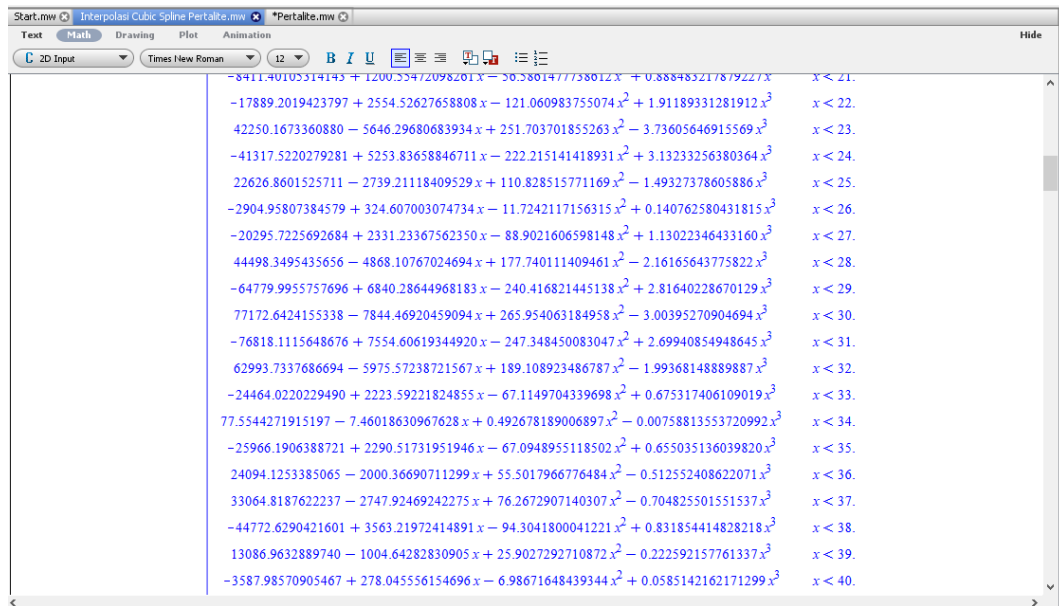
Start.mw Interpolasi Cubic Spline Peralite.mw *Peralite.mw
Text Math Drawing Plot Animation
C 2D Input Times New Roman 12 B I U
> restart;
> with(linalg):
> with(plots):
> with(Student[NumericalAnalysis]):
> with(CurveFitting):
> peralite1 := [[0, 0], [1, 0], [2, 52.2], [3, 57.1], [4, 58], [5, 58.8], [6, 58.9], [7, 59], [8, 60.6], [9, 60.6], [10, 60.6], [11, 63.7], [12, 64.5], [13, 64.5], [14, 66.1], [15,
66.6], [16, 66.7], [17, 68.3], [18, 68.9], [19, 69], [20, 73.1], [21, 74.0], [22, 74.7], [23, 80.0], [24, 80.0], [25, 82], [26, 83.3], [27, 84.1], [28, 86.9], [29, 87.0], [30,
90.5], [31, 90.9], [32, 94.0], [33, 95.2], [34, 95.2], [35, 95.3], [36, 97.6], [37, 100.0], [38, 100.0], [39, 100.0], [40, 100.0], [41, 100.0], [42, 100.0], [43, 100.0], [44,
100.0], [45, 100.0], [46, 102.6], [47, 105.3], [48, 105.3], [49, 105.2], [50, 109.4], [51, 111.1], [52, 111.1], [53, 111.1], [54, 111.1], [55, 111.1], [56, 111.1], [57,
111.2], [58, 111.1], [59, 111.1], [60, 111.1], [61, 111.1], [62, 111.1], [63, 111.1], [64, 111.1], [65, 111.1], [66, 111.2], [67, 111.1], [68, 115.7], [69, 117.6], [70,
117.6], [71, 117.7], [72, 117.6], [73, 117.7], [74, 117.6], [75, 117.7], [76, 117.6], [77, 117.7], [78, 117.6], [79, 117.6], [80, 117.6], [81, 117.7], [82, 117.6], [83,
117.6], [84, 117.7], [85, 117.6], [86, 117.7]]:
> peralite2 := [[85, 117.6], [86, 117.7], [87, 117.6], [88, 117.7], [89, 117.6], [90, 122.1], [91, 125.0], [92, 125.0], [93, 125.0], [94, 125.0], [95, 125.0], [96, 125], [97,
125], [98, 125], [99, 125], [100, 125], [101, 125], [102, 125], [103, 125], [104, 125], [105, 125], [106, 125], [107, 125], [108, 125], [109, 125], [110, 125], [111, 125],
[112, 125], [113, 125], [114, 125], [115, 125], [116, 125], [117, 125], [118, 125], [119, 125], [120, 125], [121, 125], [122, 125], [123, 125], [124, 125], [125, 122.1],
[126, 117.6], [127, 117.7], [128, 117.6], [129, 117.6], [130, 117.7], [131, 117.6], [132, 117.7], [133, 117.6], [134, 117.7], [135, 117.6], [136, 117.7], [137, 117.6],
[138, 117.7], [139, 117.6], [140, 117.7], [141, 117.6], [142, 117.7], [143, 117.6], [144, 113.1], [145, 111.1], [146, 111.1], [147, 111.1], [148, 111.1], [149, 111.1],
[150, 111.1], [151, 111.2], [152, 111.1], [153, 111.1], [154, 111.1], [155, 111.1], [156, 111.1], [157, 111.1], [158, 111.1], [159, 111.1], [160, 108.2]]:
> peralite3 := [[159, 111.1], [160, 108.2], [161, 105.3], [162, 105.3], [163, 105.2], [164, 105.3], [165, 105.2], [166, 105.3], [167, 105.3], [168, 96.2], [169, 95.3], [170,
95.2], [171, 95.2], [172, 95.3], [173, 95.2], [174, 95.2], [175, 95.3], [176, 93.1], [177, 90.9], [178, 90.9], [179, 90.9], [180, 90.9], [181, 90.9], [182, 90.9], [183, 87.4],
[184, 86.9], [185, 87], [186, 86.9], [187, 84.9], [188, 80], [189, 80], [190, 80], [191, 80], [192, 78.2], [193, 74.1], [194, 74.1], [195, 69.6], [196, 66.7], [197, 66.6],
[198, 64.2], [199, 62.5], [200, 62.5], [201, 60.4], [202, 57.1], [203, 57.1], [204, 57.2], [205, 54.3], [206, 54.1], [207, 54.1], [208, 50.3], [209, 35.8], [210, 35.7], [211,
35.7], [212, 35.7], [213, 35.7], [214, 21.4], [215, 12.0], [216, 11.9], [217, 11.9], [218, 11.9], [219, 11.9], [220, 11.9], [221, 11.9], [222, 11.9], [223, 3.6]]:
> pICS1 := CubicSpline(peralite1, independentvar = x):
> p1ICS := expand(Interpolant(pICS1))
-17.3057164843060 x + 17.3057164843060 x^3 x < 1.
-172.208613201815 x + 51.6342989058363 + 154.902896717509 x^2 - 34.3285824215302 x^3 x < 2.
-387.063266080924 + 485.837734278325 x - 174.120277022561 x^2 + 20.5086132018148 x^3 x < 3.
285.627790782757 - 186.853322585356 x + 50.1100752653324 x^2 - 4.40587038572894 x^3 x < 4.

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Start.mw Interpolasi Cubic Spline Peralite.mw *Peralite.mw
Text Math Drawing Plot Animation
C 2D Input Times New Roman 12 B I U
-387.063266080924 + 485.837734278325 x - 174.120277022561 x^2 + 20.5086132018148 x^3 x < 3.
285.627790782757 - 186.853322585356 x + 50.1100752653324 x^2 - 4.40587038572894 x^3 x < 4.
-61.2994877343583 + 73.3421363024809 x - 14.9387894566268 x^2 + 1.01486834110098 x^3 x < 5.
97.2594272376383 - 21.7932126807171 x + 4.08828034001283 x^2 - 0.253602978674989 x^3 x < 6.
-108.620228053538 + 81.1466149648711 x - 13.0683576009185 x^2 + 0.699543573598975 x^3 x < 7.
489.611178983182 - 175.238273765152 x + 23.5580550747990 x^2 - 1.04457131572091 x^3 x < 8.
-239.125079579670 + 98.0378231959176 x - 10.6014570453347 x^2 + 0.378741689284661 x^3 x < 9.
-786.504111297623 + 280.497500435235 x - 30.8747545163699 x^2 + 1.12960455858226 x^3 x < 10.
2140.26037089836 - 597.531844223560 x + 56.9281799495096 x^2 - 1.79715992361372 x^3 x < 11.
-1128.93525327795 + 294.066962369979 x - 24.1262570135394 x^2 + 0.659035135872613 x^3 x < 12.
-1132.36402734308 + 294.924155886261 x - 24.1976898065629 x^2 + 0.661019380123266 x^3 x < 13.
2304.03405682313 - 498.090786613633 x + 36.8034596165058 x^2 - 0.903112656365676 x^3 x < 14.
-864.034409455705 + 180.781027588975 x - 11.6873842551090 x^2 + 0.251431245339439 x^3 x < 15.
-2031.63735958683 + 414.301617615200 x - 27.2554235901907 x^2 + 0.597387675007921 x^3 x < 16.
3450.32460548573 - 613.566250835904 x + 36.9863181880034 x^2 - 0.740981945371121 x^3 x < 17.
465.568764758045 - 86.8446318839607 x + 6.00269354377137 x^2 - 0.133459893523436 x^3 x < 18.
-10663.5284357897 + 1768.00490154067 x - 97.0445027575968 x^2 + 1.77482151946486 x^3 x < 19.
18423.0741645806 - 2824.61656167569 x + 144.672416359054 x^2 - 2.46582618433602 x^3 x < 20.
-8411.40105314143 + 1200.55472098261 x - 56.5861477738612 x^2 + 0.888483217879227 x^3 x < 21.
-17889.2019423797 + 2554.52627658808 x - 121.060983755074 x^2 + 1.91189331281912 x^3 x < 22.

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Start.mw Interpolasi Cubic Spline Pertalite.mw *Pertalite.mw
Text Math Drawing Plot Animation Hide
C 2D Input Times New Roman 12 B I U
-22769.7622264656 + 1191.73013126342x - 20.6877058834096x2 + 0.119695135127401x3 x < 58.
12056.8044580650 - 609.644007591613x + 10.3704689244357x2 - 0.0588001223889512x3 x < 59.
-3203.98006520654 + 166.328086812023x - 2.78160047223611x2 + 0.0155053544284036x3 x < 60.
840.976281455878 - 35.9197305210981x + 0.589196483315904x2 - 0.00322129532466317x3 x < 61.
704.532964532496 - 29.2094034592925x + 0.479191121646960x2 - 0.00262017312975091x3 x < 62.
-3185.49501594020 + 159.017756886160x - 2.55673081940873x2 + 0.0137019878436668x3 x < 63.
13290.0433252117 - 625.531687930598x + 9.89643497133347x2 - 0.0521877782449163x3 x < 64.
-51521.6274746747 + 2412.51538081408x - 37.5730504778021x2 + 0.195049125135998x3 x < 65.
1.74510633877183 105 - 8019.74283542550x + 122.923229772038x2 - 0.628008722299077x3 x < 66.
-5.85914700973195 105 + 26545.0451123190x - 400.785678527121x2 + 2.01698576406031x3 x < 67.
7.84638258462321 105 - 34822.9978474803x + 515.155261171375x2 - 2.53993433394216x3 x < 68.
-2.47543236223172 105 + 10714.4210357032x - 154.512663581323x2 + 0.742751571708324x3 x < 69.
-1.24738843980526 105 + 5375.09963384908x - 77.1311939892344x2 + 0.368928047108860x3 x < 70.
76736.5459071244 - 3259.55993276453x + 46.2210855338172x2 - 0.218463760143766x3 x < 71.
-74799.6621081733 + 3143.37843407904x - 43.9611449851063x2 + 0.204926993466204x3 x < 72.
76802.9286320540 - 3173.39618009710x + 43.7718357673400x2 - 0.201244213721048x3 x < 73.
-79307.2885963090 + 3242.09219915070x - 44.1115666881092x2 + 0.200049861417989x3 x < 74.
82379.1513590095 - 3312.76347471356x + 44.4675640397862x2 - 0.198955231950909x3 x < 75.
-84146.0057517249 + 3348.24280971581x - 44.3458530859387x2 + 0.195771066385647x3 x < 76.

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Start.mw Interpolasi Cubic Spline Pertalite.mw *Pertalite.mw
Text Math Drawing Plot Animation Hide
C 2D Input Times New Roman 12 B I U
-84146.0057517249 + 3348.24280971581x - 44.3458530859387x2 + 0.195771066385647x3 x < 76.
82621.0205359207 - 3234.66612269125x + 42.2713697088910x2 - 0.184129033591677x3 x < 77.
-65694.7276773865 + 2543.86952198306x - 32.7745477544117x2 + 0.140745067981062x3 x < 78.
38515.1386763605 - 1464.20226085337x + 18.6109879229784x2 - 0.0788512383325707x3 x < 79.
-37171.8322325864 + 1409.98650784082x - 17.7711483896063x2 + 0.0746598853492210x3 x < 80.
62385.6402351430 - 2323.41870969904x + 28.8964168296419x2 - 0.119788303064313x3 x < 81.
-56806.8134789897 + 2091.11661304662x - 25.6040192536378x2 + 0.104493326908031x3 x < 82.
-193.267209816813 + 19.8893105159039x - 0.345149710580288x2 + 0.00181499543218785x3 x < 83.
64743.6126688676 - 2327.22682967751x + 27.9333580025934x2 - 0.111753308636783x3 x < 84.
-87552.5974897711 + 3111.92353313102x - 36.8184320308415x2 + 0.145198239114943x3 x < 85.
44016.2448259860 - 1531.68266624865x + 17.8122291383311x2 - 0.0690396478229886x3 otherwise
> pICS2 := CubicSpline(pertalite2, independentvar = x) :
> p2ICS := expand(Interpolant(pICS2))
59453.2474026266 - 2094.59261091220x - 0.0966454097495710x3 + 24.6445794861406x2 x < 86.
-1.82166909059412 105 + 6334.01749822869x - 73.3625148061953x2 + 0.283227048747855x3 x < 87.
4.23319905092310 105 - 14544.8381621755x + 166.624331865117x2 - 0.636262785241849x3 x < 88.
-1.27905635546506 106 + 43490.7161750075x - 492.870603784690x2 + 1.86182409221954x3 x < 89.
1.45118824742537 106 - 48540.0007763553x + 541.182395668825x2 - 2.01103358363632x3 x < 90.
-1959.40170096675 - 101.745805477378x + 2.97956265907029x2 - 0.0176897576742641x3 x < 91.
-6.04426132257137 105 + 19759.7947623085x - 215.279124899016x2 + 0.781792614333377x3 x < 92.

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Start.mw Interpolasi Cubic Spline Pertalike.mw *Pertalike.mw
Text Math Drawing Plot Animation
C 2D Input Times New Roman 12 B I U
pICS2 := CubicSpline(pertalite2, independentvar = x) :
p2ICS := expand(Interpolant(pICS2))

59453.2474026266 - 2094.59261091220 x - 0.0966454097495710 x^3 + 24.6445794861406 x^2 x < 86.
-1.82166909059412 10^5 + 6334.01749822869 x - 73.3625148061953 x^2 + 0.283227048747855 x^3 x < 87.
4.23319905092310 10^5 - 14544.8381621755 x + 166.624331865117 x^2 - 0.636262785241849 x^3 x < 88.
-1.27905635546506 10^6 + 43490.7161750075 x - 492.870603784690 x^2 + 1.86182409221954 x^3 x < 89.
1.45118824742537 10^6 - 48540.0007763553 x + 541.182395668825 x^2 - 2.01103358363632 x^3 x < 90.
-1959.40170096675 - 101.745805477378 x + 2.97956265907029 x^2 - 0.0176897576742641 x^3 x < 91.
-6.04426132257137 10^5 + 19759.7947623085 x - 215.279124899016 x^2 + 0.781792614333377 x^3 x < 92.
1.67466502069150 10^5 - 5410.61722659220 x + 58.3123097629478 x^2 - 0.209480699659245 x^3 x < 93.
-46179.4717225530 + 1481.18837959176 x - 15.7931268626861 x^2 + 0.0561301843036011 x^3 x < 94.
12933.3758297842 - 405.391861440279 x + 4.27687570148449 x^2 - 0.0150400375551600 x^3 x < 95.
-3416.76839719225 + 110.928482569504 x - 1.15807528809216 x^2 + 0.00402996591703880 x^3 x < 96.
1104.04856429194 - 30.3470474768775 x + 0.313544816557644 x^2 - 0.00107982611299523 x^3 x < 97.
-145.551042434999 + 8.30036304045055 x - 0.0848820959921295 x^2 + 0.000289338534942133 x^3 x < 98.
199.740830519073 - 2.26979633569449 x + 0.0229766731522077 x^2 - 0.0000775280267732992 x^3 x < 99.
104.358887384363 + 0.620565577478540 x - 0.00621890172832801 x^2 + 0.0000207735721510634 x^3 x < 100.
130.698721366380 - 0.169629441981993 x + 0.00168304846627732 x^2 - 0.0000556626183095438 x^3 x < 101.
123.427127873723 + 0.0463584835424978 x - 0.000455445845846350 x^2 + 0.00000149147517275411 x^3 x < 102.
125.433993214259 - 0.0126669676497611 x + 0.000123235048195403 x^2 - 3.99638860062076 10^-7 x^3 x < 103.

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Start.mw Interpolasi Cubic Spline Pertalike.mw *Pertalike.mw
Text Math Drawing Plot Animation
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125.427127873723 + 0.0463584835424978 x - 0.000455445845846350 x^2 + 0.00000149147517275411 x^3 x < 102.
125.433993214259 - 0.0126669676497611 x + 0.000123235048195403 x^2 - 3.99638860062076 10^-7 x^3 x < 103.
124.880287542162 + 0.00346038202297214 x - 0.0000333411622194826 x^2 + 1.07080267494189 10^-7 x^3 x < 104.
125.033001865550 - 0.000944838843990910 x + 0.00000901673073208518 x^2 - 2.86822099146819 10^-8 x^3 x < 105.
124.990944443946 + 0.000256801773279293 x - 0.00000242746562286913 x^2 + 7.64857216453816 10^-9 x^3 x < 106.
125.002331332148 - 0.0000654686475278718 x + 6.12821365877706 10^-7 x^2 - 1.91207874347076 10^-9 x^3 x < 107.
124.999989268537 + 1.96687346686778 10^-7 x - 8.73352576112881 10^-10 x^2 - 2.57190655124409 10^-13 x^3 x < 108.
124.997578980068 + 0.0000671491448152361 x - 6.20803514321940 10^-7 x^2 + 1.91310750609126 10^-9 x^3 x < 109.
125.009966295501 - 0.000273786142336296 x + 0.00000250704315679304 x^2 - 7.65217283370990 10^-9 x^3 x < 110.
124.961587431384 + 0.00104563742451094 x - 0.00000948771654181818 x^2 + 2.86955838287483 10^-8 x^3 x < 111.
125.147346932635 - 0.00397488963634677 x + 0.0000357422569794224 x^2 - 1.07130162481283 10^-7 x^3 x < 112.
124.435111337260 + 0.0151028495254881 x - 0.000134594699822674 x^2 + 3.99825066096385 10^-7 x^3 x < 113.
127.165065489183 - 0.05737378093751126 x + 0.000506791662129544 x^2 - 0.00000149217010190426 x^3 x < 114.
116.703845609629 + 0.217921450613138 x - 0.00190807903952177 x^2 + 0.00000556885534152065 x^3 x < 115.
156.782105743572 - 0.827598378967969 x + 0.00718339773944437 x^2 - 0.0000207832512641783 x^3 x < 116.
3.27204094447558 + 3.14248950376728 x - 0.0270414978013767 x^2 + 0.0000775641497151927 x^3 x < 117.
591.124068126495 - 11.9306393983358 x + 0.101788663755060 x^2 - 0.000289473347596592 x^3 x < 118.
-1659.50541808027 + 45.2887543187855 x - 0.383121452491730 x^2 + 0.00108032924067118 x^3 x < 119.
6955.31867935820 - 171.891685112437 x + 1.44192425701434 x^2 - 0.00403184361508811 x^3 x < 120.
-26013.0012271233 + 652.316312549601 x - 5.42647572350265 x^2 + 0.0150470452196813 x^3 x < 121.

```

Start.mw Interpolasi Cubic Spline Pertalke.mw *Pertalke.mw

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$p2ICS :=$

$$\begin{aligned} & -26013.0012271233 + 652.316312549601x - 5.42647572350265x^2 + 0.0150470452196813x^3 & x < 121. \\ & 1.00128134248406 \cdot 10^5 - 2475.14985626519x + 20.4203521179419x^2 - 0.0561563372636370x^3 & x < 122. \\ & -3.82405582321029 \cdot 10^5 + 9390.43333806520x - 76.8385265241105x^2 + 0.209578303834867x^3 & x < 123. \\ & 1.46308169043558 \cdot 10^6 - 35621.4513633156x + 289.111755600937x^2 - 0.782156878075830x^3 & x < 124. \\ & -64517.0631158248 + 1336.58299679912x - 8.93690859353684x^2 + 0.0190492084684535x^3 & x < 125. \\ & -3.94520228915794 \cdot 10^6 + 94473.0284218098x - 754.028471993622x^2 + 2.00596004420202x^3 & x < 126. \\ & 3.75394373718460 \cdot 10^6 - 88839.9722053935x + 700.836612349261x^2 - 1.84288938527651x^3 & x < 127. \\ & -1.17955984799704 \cdot 10^6 + 27699.4825626768x - 216.796889761529x^2 + 0.565597496904039x^3 & x < 128. \\ & 2.57195001028041 \cdot 10^5 - 5974.45921134855x + 46.2807803480443x^2 - 0.119500602339642x^3 & x < 129. \\ & 1.88703783380058 \cdot 10^5 - 4381.64019627917x + 33.9333461227003x^2 - 0.0875950875454712x^3 & x < 130. \\ & -3.76971076647137 \cdot 10^5 + 8672.39503511763x - 66.4823095034289x^2 + 0.169880952521527x^3 & x < 131. \\ & 4.36409997573035 \cdot 10^5 - 9954.65246610767x + 75.7088927960009x^2 - 0.191928722540636x^3 & x < 132. \\ & -4.60031648439637 \cdot 10^5 + 10419.0213069076x - 78.6371206359330x^2 + 0.197833937641016x^3 & x < 133. \\ & 4.74532145298259 \cdot 10^5 - 10661.3650180074x + 79.8620246641794x^2 - 0.199407028023427x^3 & x < 134. \\ & -4.85987464784337 \cdot 10^5 + 10842.8053569761x - 80.6168587312198x^2 + 0.199794174452691x^3 & x < 135. \\ & 4.97089428487722 \cdot 10^5 - 11003.3478268474x + 81.2064981859916x^2 - 0.199769669787337x^3 & x < 136. \\ & -5.06713789043090 \cdot 10^5 + 11139.3702069205x - 81.6076050034784x^2 + 0.199284504696658x^3 & x < 137. \\ & 5.13220716266556 \cdot 10^5 - 11194.9620261374x + 81.416717865577x^2 - 0.197368348999294x^3 & x < 138. \\ & -5.05307615362649 \cdot 10^5 + 10946.9582266714x - 79.0319796185641x^2 + 0.190188891300517x^3 & x < 139. \end{aligned}$$

(2)

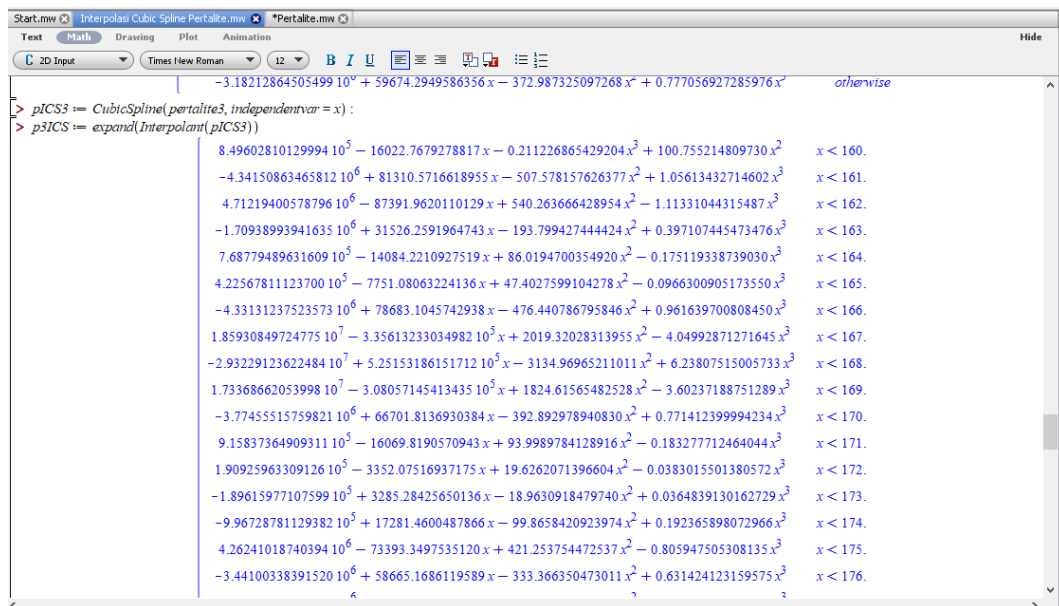
Start.mw Interpolasi Cubic Spline Pertalke.mw *Pertalke.mw

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$$\begin{aligned} & -5.05307615362649 \cdot 10^5 + 10946.9582266714x - 79.0319796185641x^2 + 0.190188891300517x^3 & x < 139. \\ & 4.44263096894238 \cdot 10^5 - 9547.37369254201x + 68.4092572103092x^2 - 0.163387216202776x^3 & x < 140. \\ & -1.77931191679227 \cdot 10^5 + 3785.36106260368x - 26.8245624693028x^2 + 0.0633599735105860x^3 & x < 141. \\ & -8.69170025748797 \cdot 10^5 + 18492.5702981264x - 131.131010948188x^2 + 0.309947322160432x^3 & x < 142. \\ & 4.89490526695487 \cdot 10^6 - 1.03283668280120 \cdot 10^5x + 726.448133969042x^2 - 1.70314926215231x^3 & x < 143. \\ & -6.81888017610548 \cdot 10^6 + 1.42460082273594 \cdot 10^5x - 992.039632140845x^2 + 2.30264972644882x^3 & x < 144. \\ & 1.87062998139869 \cdot 10^6 - 38571.3793410766x + 265.123295738810x^2 - 0.607449643642972x^3 & x < 145. \\ & 1.15542715443845 \cdot 10^6 - 23774.0794729337x + 163.072951820582x^2 - 0.372851151876932x^3 & x < 146. \\ & -3.12584211718359 \cdot 10^5 + 6390.53763987741x - 43.5340147055207x^2 + 0.0988542511507007x^3 & x < 147. \\ & 73109.5409079597 - 1480.76343412909x + 10.0122511040473x^2 - 0.0225658527258707x^3 & x < 148. \\ & 27805.4572547624 - 562.437414131847x + 3.80734556352537x^2 - 0.00859084024721778x^3 & x < 149. \\ & -1.88931539728648 \cdot 10^5 + 3801.39473989655x - 25.4801185574706x^2 + 0.0569292137147418x^3 & x < 150. \\ & 4.05254855873260 \cdot 10^5 - 8082.33317214162x + 53.7447341894505x^2 - 0.119126014611750x^3 & x < 151. \\ & -4.16580506506044 \cdot 10^5 + 8245.52170956642x - 54.3867550933841x^2 + 0.119574844732256x^3 & x < 152. \\ & 2.11148884019775 \cdot 10^5 - 4143.87415607476x + 27.1224282332025x^2 - 0.0591733643172758x^3 & x < 153. \\ & -62096.7055654825 + 1213.88250245971x - 7.89558914283975x^2 + 0.0171186125368468x^3 & x < 154. \\ & 34395.0076710181 - 665.826196952637x + 4.31031150269499x^2 - 0.00930108583011149x^3 & x < 155. \\ & -75037.8240463635 + 1452.22861048056x - 9.35455822268045x^2 + 0.0200857307835991x^3 & x < 156. \\ & 2.70920333483569 \cdot 10^5 - 5200.81288047969x + 33.2931436424493x^2 - 0.0710418373042850x^3 & x < 157. \end{aligned}$$



Start.mw Interpolasi Cubic Spline Pertalke.mw *Pertalke.mw

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$$\begin{aligned}
 &-3.44100338391520 \cdot 10^6 + 58665.1686119589 x - 333.366350473011 x^2 + 0.631424123159575 x^3 < 176. \\
 &-3.16201904830189 \cdot 10^6 + 53909.7538003684 x - 306.346948134429 x^2 + 0.580251012669836 x^3 < 177. \\
 &4.22799755513961 \cdot 10^6 - 71344.7649020299 x + 401.305699901720 x^2 - 0.752428173838919 x^3 < 178. \\
 &-1.30961772697560 \cdot 10^6 + 21985.8297403613 x - 123.023483482500 x^2 + 0.229461682685839 x^3 < 179. \\
 &9.55154311475846 \cdot 10^5 - 15971.2435297747 x + 89.0272051774774 x^2 - 0.165418556904436 x^3 < 180. \\
 &-2.53023027443370 \cdot 10^6 + 42118.4995687178 x - 233.693589814148 x^2 + 0.432212544931906 x^3 < 181. \\
 &9.30342276851456 \cdot 10^6 - 1.54019396170756 \cdot 10^5 x + 849.941193276869 x^2 - 1.56343162282319 x^3 < 182. \\
 &-1.41172357716101 \cdot 10^7 + 2.32035414930200 \cdot 10^5 x - 1271.23908749762 x^2 + 2.32151394636085 x^3 < 183. \\
 &7.60296855548487 \cdot 10^6 - 1.24033508464800 \cdot 10^5 x + 674.492734332984 x^2 - 1.22262416262021 x^3 < 184. \\
 &-1.06605198730059 \cdot 10^6 + 17309.2177762676 x - 93.6742561075992 x^2 + 0.168982704119980 x^3 < 185. \\
 &1.60772586891759 \cdot 10^6 - 26049.3420542975 x + 140.696337571131 x^2 - 0.253306653859714 x^3 < 186. \\
 &5.48440122927474 \cdot 10^6 - 88576.3639955419 x + 476.863122201478 x^2 - 0.855756088681124 x^3 < 187. \\
 &-1.76126333134240 \cdot 10^7 + 2.81964297117272 \cdot 10^5 x - 1504.63773936437 x^2 + 2.67633100858421 x^3 < 188. \\
 &1.37894151426432 \cdot 10^7 - 2.19132220798694 \cdot 10^5 x + 1160.76927082694 x^2 - 2.04956794565570 x^3 < 189. \\
 &-4.24665885985869 \cdot 10^6 + 67154.6681299076 x - 353.976173239739 x^2 + 0.621940774038610 x^3 < 190. \\
 &3.02481344654296 \cdot 10^6 - 47658.0524974869 x + 250.301303746548 x^2 - 0.438195150498736 x^3 < 191. \\
 &4.63414792218027 \cdot 10^6 - 72935.5573504289 x + 382.644261091794 x^2 - 0.669160172043667 x^3 < 192. \\
 &-1.86096080341220 \cdot 10^7 + 2.90248129466794 \cdot 10^5 x - 1508.93744108124 x^2 + 2.61483583867340 x^3 < 193. \\
 &2.45608159962559 \cdot 10^7 - 3.80794731109027 \cdot 10^5 x + 1967.96857226498 x^2 - 3.39018318264995 x^3 < 194. \\
 &-1.7370507780747 \cdot 10^7 + 2.66854507051730 \cdot 10^5 x - 1370.43003113845 x^2 + 2.34589689192640 x^3 < 195.
 \end{aligned}$$

$p3ICS =$

(3)

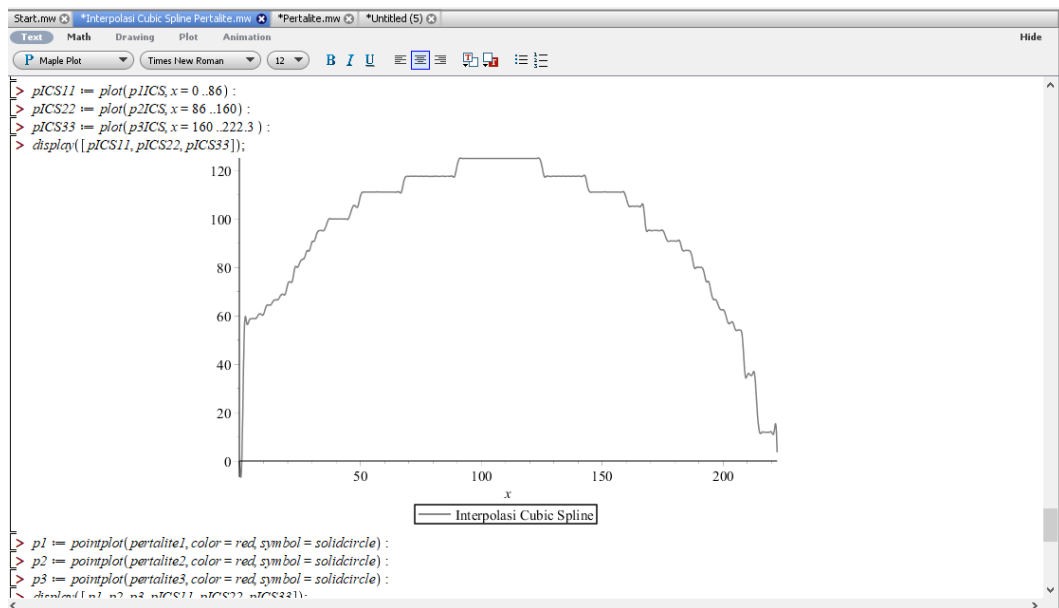
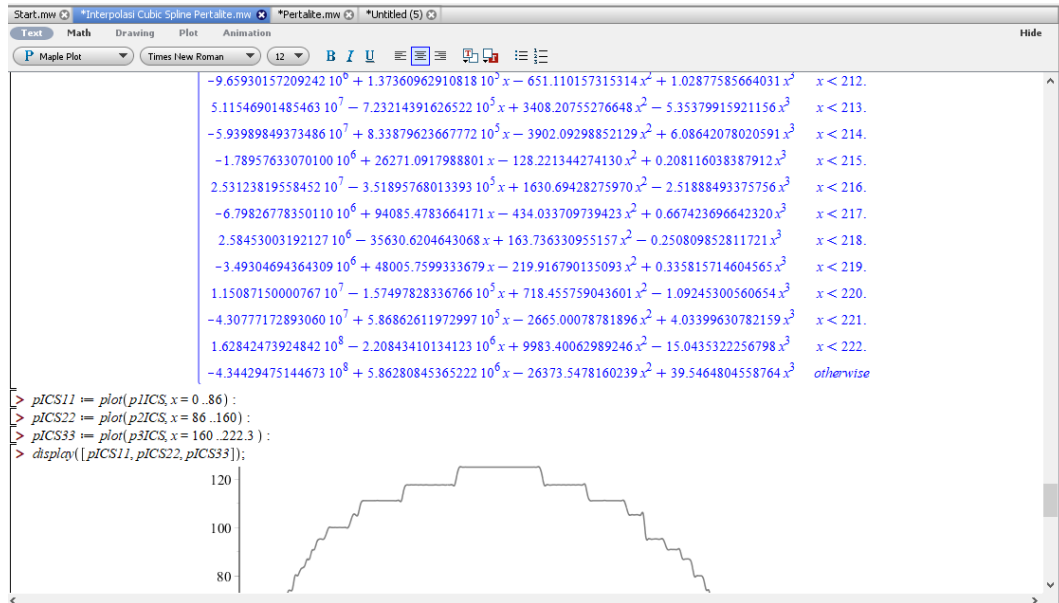
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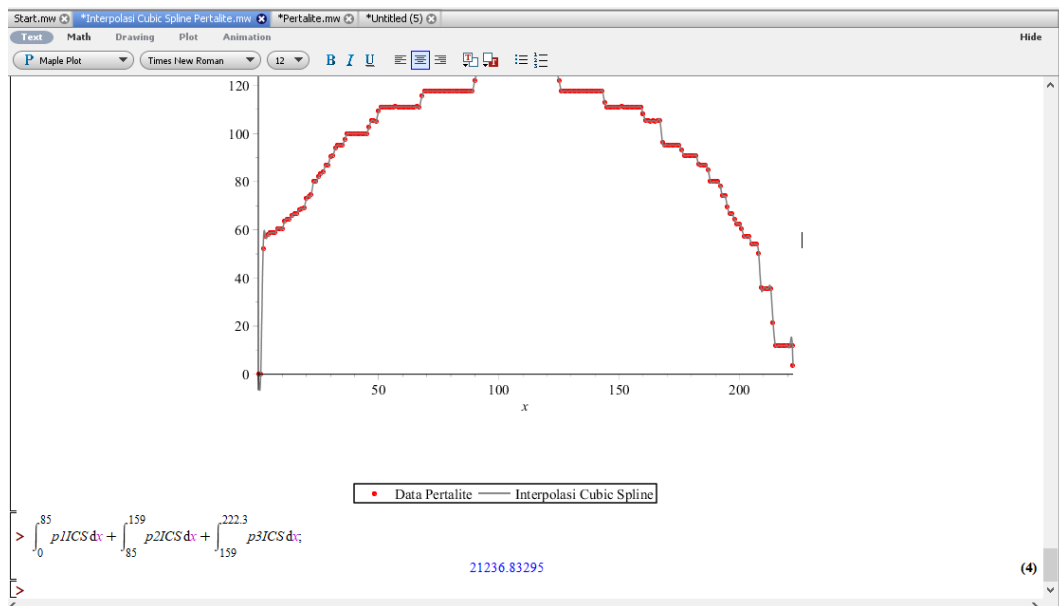
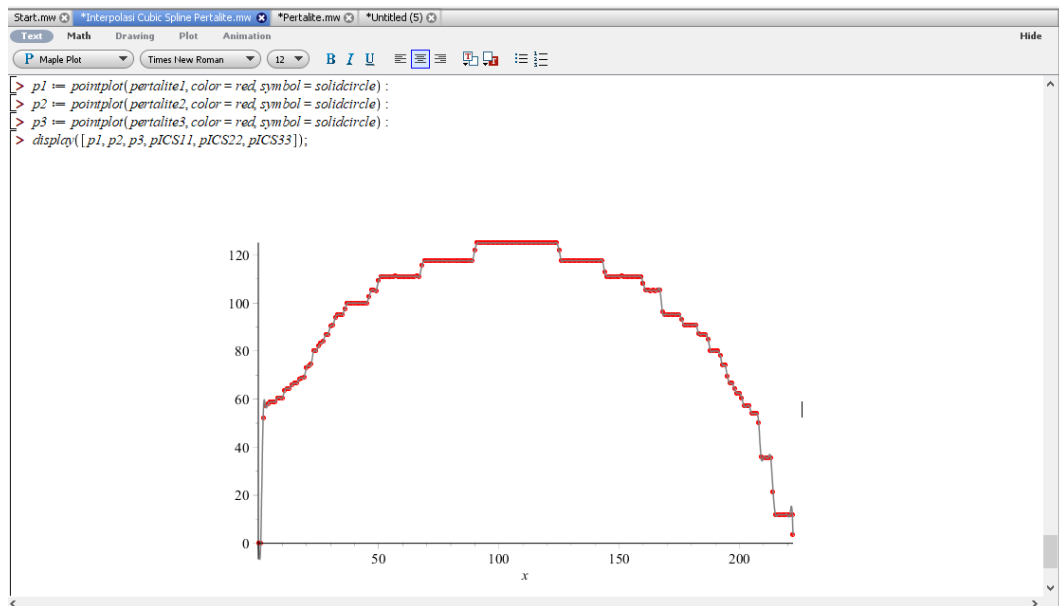
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$$\begin{aligned}
 &2.45608159962559 \cdot 10^7 - 3.80794731109027 \cdot 10^5 x + 1967.96857226498 x^2 - 3.39018318264995 x^3 < 194. \\
 &-1.73205072829747 \cdot 10^7 + 2.66854597951239 \cdot 10^5 x - 1370.43003113845 x^2 + 2.34589689192640 x^3 < 195. \\
 &-7.16368226812463 \cdot 10^5 + 11406.3047795121 x - 60.4387841039551 x^2 + 0.106595614944352 x^3 < 196. \\
 &1.19247812740637 \cdot 10^7 - 1.82080677376755 \cdot 10^5 x + 926.739696285164 x^2 - 1.57227935170381 x^3 < 197. \\
 &-8.37216370939144 \cdot 10^6 + 1.27009855366216 \cdot 10^5 x - 642.247779567482 x^2 + 1.08252179187089 x^3 < 198. \\
 &-1.84919588560107 \cdot 10^6 + 28177.0095512104 x - 143.091992623009 x^2 + 0.242192184220260 x^3 < 199. \\
 &8.34422268876484 \cdot 10^6 - 1.25492617198025 \cdot 10^5 x + 629.117187021387 x^2 - 1.05129052875193 x^3 < 200. \\
 &-1.36986098755021 \cdot 10^6 + 20218.6379467012 x - 99.4390887022414 x^2 + 0.162969930787453 x^3 < 201. \\
 &-1.05984438920110 \cdot 10^7 + 1.57958681296863 \cdot 10^5 x - 784.712936215484 x^2 + 1.29941080560212 x^3 < 202. \\
 &7.20535486617760 \cdot 10^6 - 1.06454171547523 \cdot 10^5 x + 524.261582816129 x^2 - 0.860613153195924 x^3 < 203. \\
 &8.84786496195170 \cdot 10^6 - 1.30727719760933 \cdot 10^5 x + 643.835711946229 x^2 - 1.05695819281842 x^3 < 204. \\
 &-1.70065927380402 \cdot 10^7 + 2.49484893474242 \cdot 10^5 x - 1219.95160783404 x^2 + 1.98844592446960 x^3 < 205. \\
 &1.04349187862860 \cdot 10^7 - 1.52098202003702 \cdot 10^5 x + 738.990321326663 x^2 - 1.19682550506000 x^3 < 206. \\
 &-2.64005456275865 \cdot 10^6 + 38314.0312348117 x - 185.340907986512 x^2 + 0.298856095770384 x^3 < 207. \\
 &3.54772666088474 \cdot 10^7 - 5.14110913281218 \cdot 10^5 x + 2483.37863073827 x^2 - 3.99859887802154 x^3 < 208. \\
 &-7.96560580177241 \cdot 10^7 + 1.14646588421741 \cdot 10^6 x - 5500.16366492821 x^2 + 8.79553941631576 x^3 < 209. \\
 &5.61801247058593 \cdot 10^7 - 8.03335781671348 \cdot 10^5 x + 3829.03090870221 x^2 - 6.08355878724152 x^3 < 210. \\
 &-1.16312744028588 \cdot 10^7 + 1.65398491310339 \cdot 10^5 x - 783.989438829635 x^2 + 1.23869573265030 x^3 < 211. \\
 &-9.65930157209242 \cdot 10^6 + 1.37360962910818 \cdot 10^5 x - 651.110157315314 x^2 + 1.02877585664031 x^3 < 212. \\
 &5.11546901485463 \cdot 10^7 - 7.23214391626522 \cdot 10^5 x + 3408.20755276648 x^2 - 5.35379915921156 x^3 < 213.
 \end{aligned}$$





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```

> p3 := pointplot(pertalte3, color = red, symbol = solidcircle) :
> pICS1 := CubicSpline(pertalte1, independentvar = x) :
> p1ICS := expand(Interpolant(pICS1)) :
> pICS2 := CubicSpline(pertalte2, independentvar = x) :
> p2ICS := expand(Interpolant(pICS2)) :
> pICS3 := CubicSpline(pertalte3, independentvar = x) :
> p3ICS := expand(Interpolant(pICS3)) :
> pICS11 := plot(p1ICS, x = 0 .. 86) :
> pICS22 := plot(p2ICS, x = 86 .. 160) :
> pICS33 := plot(p3ICS, x = 160 .. 222.3) :

> COMh :=  $\sqrt{\left(\frac{108.35 + 108.75}{2}\right)^2 - \left(x - \left(\frac{108.35 + 108.75}{2}\right)\right)^2}$  :
> fCOM := plot(COMh, x = 0 .. 222.3) :

> EOMh :=  $125 \cdot \sqrt{0.93 - \left(\frac{(x - (111.15 \cdot \sqrt{0.93}))^2}{(111.15)^2}\right)}$  :
> fEOM := plot(EOMh, x = 0 .. 222.3 \cdot \sqrt{0.93}) :

> EOMh3 :=  $128 \cdot \sqrt{0.93 - \left(\frac{(x - (111.15 \cdot \sqrt{0.93}))^2}{(111.15)^2}\right)}$  :
> fEOM3 := plot(EOMh3, x = 0 .. 222.3 \cdot \sqrt{0.93}) :

> EOMh4 :=  $129 \cdot \sqrt{0.93 - \left(\frac{(x - (111.15 \cdot \sqrt{0.93}))^2}{(111.15)^2}\right)}$  :
> fEOM4 := plot(EOMh4, x = 0 .. 222.3 \cdot \sqrt{0.93}) :

> EOMh5 :=  $(130.73) \cdot \sqrt{0.93 - \left(\frac{(x - (111.15 \cdot \sqrt{0.93}))^2}{(111.15)^2}\right)}$  :

```

