

## BAB VI

### KESIMPULAN dan SARAN

#### 6.1 Kesimpulan

Berdasarkan analisis data dari penelitian yang telah dilakukan, dapat diambil kesimpulan sebagai berikut:

1. Kapasitas tarik pada tiang kelompok tertinggi terjadi pada tiang dengan jarak 5D dan terendah terjadi pada tiang dengan jarak 3D. Peningkatan kapasitas tarik tiang terjadi seiring dengan penambahan jarak pada kedua jenis tiang, yaitu: tiang polos dan tiang tarik
2. Kapasitas tarik kelompok tiang sirip memiliki nilai yang lebih tinggi daripada kapasitas tarik pada kelompok tiang polos
3. Nilai efisiensi tiang kelompok yang memiliki nilai lebih dari 80% menurut persamaan *Conversi-Labbare* adalah tiang polos dan tiang sirip dengan jarak 4D (84,4%) dan 5D (87,4). Nilai efisiensi tiang kelompok yang memiliki nilai lebih dari 80% menurut persamaan *Los Angeles Group Action* adalah tiang polos dan tiang sirip dengan jarak 5D (82,8%)
4. Perbandingan antara kapasitas tarik tiang kelompok dan tiang tunggal menggunakan metode Broms dan Das dengan uji pembebanan menunjukkan pola peningkatan nilai yang sama.

- a. Pada kelompok tiang sirip, nilai kapasitas tarik menurut metode Das terendah sebesar 0,0358 KN (3650,58 gram) dan tertinggi sebesar 0,0394 KN (4017,68 gram), sedangkan dari pengamatan terendah sebesar 158.800 gram dan tertinggi sebesar 230800 gram
  - b. Pada kelompok tiang polos, nilai kapasitas tarik menurut metode Broms terendah sebesar 0,0166 KN (1692,73 gram) dan tertinggi sebesar 0,0182 KN (1855,88 gram), sedangkan dari pengamatan terendah sebesar 29.640gram dan tertinggi sebesar 39640 gram
  - c. Pada tiang tunggal, nilai kapasitas tarik menurut metode Broms dan Das berturut-turut: tiang polos (0,0056 KN), tiang sirip dengan rasio 1,5 (0,0337 KN), tiang sirip dengan rasio 2 (0,0332 KN), tiang dengan rasio 4,5 (0,0304 KN). Sedangkan dari pengamatan diperoleh nilai berturut-turut: tiang polos (12560 gram/ 0,12 KN), tiang sirip dengan rasio 1,5 (96140 gram/ 0,94 KN), tiang sirip dengan rasio 2 (83140 gram/ 0,82 KN), tiang dengan rasio 4,5 (69140 gram/ 0,68 KN).
5. Pada tiang tunggal, kapasitas tarik tertinggi terjadi pada tiang sirip dengan rasio jarak 1,5 dengan persentase kenaikan 665,45%, dan terendah terjadi pada tiang polos. Sedangkan perpindahan vertikal tertinggi terjadi pada tiang polos sebesar 223mm dan terendah pada tiang sirip dengan rasio jarak tiang 4,5 sebesar 151mm
  6. Pada tiang sirip tunggal, kapasitas tarik tertinggi terjadi pada tiang sirip dengan rasio jarak tiang 1,5 sebesar 96.140 gram dan terendah pada tiang

sirip dengan rasio jarak sirip 4,5 sebesar 69.140 gram. Hal ini menunjukkan bahwa peningkatan kapasitas tarik terjadi seiring dengan penurunan rasio jarak sirip.

7. Garis trend keruntuhan tiang pada kedua jenis tiang membentuk pola yang berbeda apabila diperhatikan dari persamaan garis lengkungnya, pola tersebut antara lain:
  - a. Pada kelompok tiang polos persamaan garis lengkung grafik berturut-turut adalah: Polos 3D ( $y = 0.018x^2 - 0.999x + 10.19$ ), Polos 4D ( $y = 0.002x^2 + 0.601x - 6.543$ ), Polos 5D ( $y = 0.001x^2 + 1.303x - 19.83$ ). Pada tiang sirip persamaan garis lengkung grafik berturut-turut adalah: Sirip 3D ( $y = 0.005x^2 + 0.819x - 16.00$ ), Sirip 4D ( $y = 0.003x^2 + 0.742x - 12.56$ ), Sirip 5D ( $y = 0.001x^2 + 1.024x - 17.65$ ).
  - b. Pada tiang tunggal, garis trend keruntuhan tiang polos hampir lurus dengan persamaan ( $y = 0.001x^2 + 3.968x - 14.73$ ), sedangkan pada tiang sirip dengan variasi jarak sirip, garis trend cenderung memiliki kelengkungan yang sama dengan persamaan: tiang sirip dengan rasio 1,5 ( $y = 0.014x^2 + 1.143x - 6.222$ ), tiang sirip dengan rasio 2 ( $y = 0.012x^2 + 1.972x - 14.54$ ), tiang sirip dengan rasio 4,5 ( $y = 0.037x^2 + 0.577x - 1.766$ ).

## 6.2 Saran

Untuk pengujian selanjutnya, tanah yang digunakan adalah tanah pasir yang memiliki gradasi butiran yang bervariasi atau mendekati kondisi asli di lapangan. Selama pengujian, tanah pada kotak uji sebaiknya ditutup dengan plastik pada bagian atas dengan tujuan untuk menghambat penguapan air. Pemadatan tanah juga harus dilakukan dalam beberapa lapisan untuk mendapatkan kepadatan tanah yang sama pada seluruh bagian tanah.

Ketebalan plat yang digunakan untuk menggabungkan tiang sebaiknya ditambah. Hal ini bertujuan untuk mengantisipasi kerusakan plat akibat menerima beban yang besar. Penambahan ketebalan plat dapat dilakukan dengan mengelas beberapa plat menjadi satu.

Pada pelaksanaannya, skala beban untuk pengujian dapat dibuat lebih kecil agar penurunan tiang dapat dilihat lebih detail. Peletakkan *dial* juga harus diperhatikan agar ketika model mengalami keruntuhan tidak merusak *dial*. Kawat baja/seling yang digunakan untuk menyalurkan beban ke model juga harus dipastikan tidak mengalami regangan yang terlalu besar.

Peralatan pengujian tarik pada penelitian ini menggunakan katrol sebagai tempat untuk meletakkan kawat baja. Oleh karena itu kemampuan katrol untuk menahan beban maksimum dari kotak beban ke model tiang harus diperhatikan. Hal ini bertujuan agar katrol tidak mengalami kerusakan selama pembebanan akibat kapasitas katrol lebih kecil dari beban yang harus ditahan. Selain kemampuan tiang untuk menahan beban, kekasaran permukaan katrol juga harus

dusahakan sedemikian rupa agar memiliki tingkat kekasaran yang rendah. Hal ini bertujuan agar seluruh beban dari kotak beban disalurkan sepenuhnya ke model, tidak ditahan sebagian oleh katrol.

Metode analisis untuk tiang sirip dapat menggunakan persamaan lain. Hal ini bertujuan agar diperoleh suatu hasil yang lebih bervariasi. Berbeda halnya dengan tiang polos, tiang sirip memiliki lebih sedikit metode untuk menghitung daya dukungnya. Karena sebagian besar pengujian beban tiang menggunakan pengujian beban secara langsung di lapangan.

## Tiang Tunggal Sirip 1.5

Beban	Perpindahan		Beban	Perpindahan		Beban	Perpindahan
1	0		31	42		61	134
2	0		32	43		62	143
3	0		33	44		63	143
4	0		34	45		64	143
5	0		35	46		65	156
6	0		36	46		66	156
7	0		37	46		67	157
8	5		38	46		68	158
9	6		39	51		69	159
10	8		40	51		70	160
11	9		41	52		71	161
12	10		42	53		72	162
13	11		43	54		73	165
14	12		44	56		74	165
15	13		45	60		75	165
16	18		46	61		76	167
17	22		47	68		77	167
18	25		48	72		78	167
19	26		49	75		79	167
20	26		50	75		80	168
21	27		51	86		81	168
22	30		52	87		82	168
23	31		53	88		83	168
24	34		54	89		84	171
25	35		55	93		85	172
26	36		56	99		86	181
27	38		57	101		87	190
28	38		58	109			
29	38		59	114			
30	40		60	120			

Beban = @1 Kg  
 Beban Total = Beban+berat bak-berat poer = 96.144  
 Beban=87x1=87kg  
 B.Bak=9.3kg  
 Berat poer=156 gr

## Tiang Tunggal Polos

Beban	Perpindahan		Beban	Perpindahan
1	0		31	118
2	4.5		32	124
3	6		33	127
4	7		34	130
5	9		35	131
6	12		36	132
7	15		37	134
8	18		38	138
9	20.5		39	139
10	24		40	141
11	27		41	150
12	29		42	168
13	35		43	173
14	40		44	174
15	43		45	180
16	50		46	185
17	54		47	185
18	54		48	185
19	54		49	188
20	55		50	190
21	55		51	208
22	58		52	208
23	60		53	208
24	61		54	210
25	66		55	213
26	74		56	213
27	87		57	214
28	92		58	215
29	111		59	217
30	118		60	217
			61	217
			62	223
Beban = @200 gram Beban Total = Beban+berat ember-berat poer = 12.556 Kg Beban=62x200=12.4kg B.ember=312 gr Berat poer=156 gr				

## Tiang Tuanggal Sirip 4.5

Beban	Perpindahan		Beban	Perpindahan
1	0		31	53
2	0		32	57
3	0		33	60
4	0		34	60
5	0		35	60
6	0		36	60
7	0		37	64
8	0		38	64
9	0		39	64
10	4		40	65
11	7		41	67
12	10		42	67
13	13		43	71
14	16		44	76
15	19		45	81
16	21		46	107
17	23		47	119
18	24.5		48	135
19	26		49	135
20	29		50	135
21	32		51	142
22	34		52	143
23	40		53	145
24	40		54	146
25	40		55	147
26	40		56	147
27	45		57	150
28	48		58	151
29	49		59	151
30	53		60	151
Beban = @1 Kg Beban Total = Beban+berat bak-berat poer = 69.144 Kg Beban=60x1=60kg B.Bak=9.3kg Berat poer=156 gr				



## Tiang Sirip 2

Beban	Perpindahan		Beban	Perpindahan
1	0		41	81
2	0		42	84
3	0		43	85
4	0		44	111
5	0		45	114
6	0		46	124
7	0		47	125
8	4		48	125
9	5		49	125
10	5		50	127
11	5		51	128
12	6		52	142
13	7		53	145
14	8		54	145
15	15		55	145
16	20		56	148
17	25		57	149
18	33		58	150
19	34		59	163
20	35		60	163
21	36		61	163
22	38		62	163
23	38		63	171
24	38		64	173
25	40		65	173
26	40		66	173
27	42		67	174
28	42		68	175
29	42		69	175
30	42		70	175
31	45		71	175
32	50		72	176
33	50		73	176
34	50		74	176
35	59	Beban = @1 Kg Beban Total = Beban+berat bak-berat poer = 83.144 Kg Beban=74x1=74kg B.Bak=9.3kg Berat poer=156 gr		
36	60			
37	61			
38	62			
39	63			
40	64			

### Tiang Kelompok Polos 3D

Beban	Perpindahan		Beban	Perpindahan	
1	0		31	3	
2	0		32	3	
3	0		33	3	
4	0		34	3	
5	0		35	3	
6	0		36	5	
7	0		37	5	
8	0		38	5.5	
9	0		39	5.5	
10	0		40	5.5	
11	0		41	5.5	
12	0		42	6	
13	0		43	6	
14	0		44	6	
15	0		45	6	
16	0		46	7	
17	0		47	7	
18	0		48	8.5	
19	0		49	8.5	
20	1		50	9	
21	1		51	9	
22	1		52	11.5	
23	1		53	11.5	
24	2		54	12	
25	2		55	12	
26	2		56	12	
27	2		57	12	
28	2.5		58	12	
29	2.5		59	13	
30	3		60	13	

Beban	Perpindahan		Beban	Perpindahan
61	14		91	92
62	15		92	94
63	16		93	94
64	17		94	98
65	18		95	98
66	18.5		96	98
67	19		97	98
68	20		98	98
69	20		99	100
70	20.5		100	101
71	21		101	101
72	22.5		102	101
73	24		103	101
74	25		104	104
75	27		105	105
76	27		106	109
77	30.5		107	109
78	32		108	109
79	32		109	115
80	32		Beban = @200 Kg Beban Total = Beban+berat bak-berat poer = 29.635 Kg Beban=109x200=21.8kg B.Bak=9.3kg Berat poer=1465 gr	
81	32			
82	32			
83	55			
84	60			
85	61			
86	65			
87	86			
88	86			
89	86			
90	92			

## Tiang Kelompok Polos 4D

Beban	Perpindahan	Beban	Perpindahan	Beban	Perpindahan	Beban	Perpindahan
1	0	31	9	61	36	91	65
2	0	32	10	62	37	92	65
3	0	33	11	63	37	93	65
4	0	34	12	64	37	94	70
5	1	35	13	65	37	95	70
6	1	36	15	66	37	96	70
7	1	37	16	67	37	97	70
8	1	38	17	68	57	98	73
9	1	39	17	69	58	99	80
10	1	40	17	70	58	100	80
11	2	41	17	71	58	101	80
12	2	42	19	72	60	102	80
13	3	43	19	73	60	103	80
14	3	44	19	74	60	104	80
15	5	45	19	75	61	105	80
16	4	46	21	76	62	106	80
17	5	47	25	77	62	107	80
18	5	48	26	78	62	108	80
19	6	49	26	79	62	109	80
20	6	50	26	80	62	110	80
21	6	51	26	81	64	111	80
22	6	52	26	82	64	112	80
23	6	53	32	83	64	113	80
24	7	54	32	84	64	114	81
25	7	55	32	85	64	115	82
26	7	56	35	86	64	116	82
27	7	57	35	87	65	117	89
28	8	58	35	88	65	118	90
29	8	59	35	89	65	119	92
30	8	60	35	90	65	120	96

Beban	Perpindahan	Beban	Perpindahan
121	99	129	122
122	99	130	122
123	100	131	131
124	100	Beban = @200 Kg Beban Total = Beban+berat bak-berat poer = 34.035 Kg Beban=131x200=26.2kg B.Bak=9.3kg Berat poer=1465 gr	
125	100		
126	100		
127	100		
128	100		

## Tiang Kelompok Polos 5D

Beban	Perpindahan		Beban	Perpindahan		Beban	Perpindahan
1	0		41	32		81	98
2	0		42	33		82	98
3	0		43	34		83	98
4	0		44	35		84	98
5	0		45	36		85	98
6	0		46	37		86	98
7	0		47	37		87	100
8	0		48	37		88	100
9	0		49	37		89	105
10	1		50	37		90	105
11	1		51	38		91	105
12	1		52	38		92	105
13	2		53	38		93	112
14	2		54	38		94	112
15	3		55	40		95	112
16	4		56	40		96	112
17	5		57	40		97	112
18	5		58	40		98	112
19	5		59	53		99	112
20	8		60	53		100	112
21	10		61	53		101	124
22	11		62	53		102	125
23	11		63	56		103	136
24	11		64	65		104	136
25	11		65	66		105	136
26	13		66	66		106	158
27	14		67	66		107	158
28	15		68	66		108	158
29	15		69	69		109	158
30	16		70	70		115	158
31	17		71	75		115	158
32	17		72	78		115	158
33	17		73	80		115	158
34	17		74	88		115	177
35	18		75	89		115	177
36	28		76	94		115	177
37	28		77	94		110	178
38	29		78	94		118	178
39	30		79	94		119	178
40	30		80	94		120	178

Beban	Perpindahan	
121	178	Beban = @200 Kg
122	179	Beban Total = Beban+berat bak-berat poer = 39.635 Kg
123	179	Beban=159x200=31.8kg
124	180	B.Bak=9.3kg
125	180	Berat poer=1465 gr
126	180	
127	181	
128	181	
129	181	
130	182	
131	182	
132	183	
133	184	
134	184	
135	190	
136	190	
137	190	
138	190	
139	190	
140	191	
141	191	
142	191	
143	191	
144	191	
145	191	
146	191	
147	191	
148	193	
149	193	
150	193	
151	196	
152	196	
153	196	
154	196	
155	196	
156	197	
57	197	
158	197	
159	197	

## Tiang Kelompok Sirip 3D

Beban	Perpindahan		Beban	Perpindahan		Beban	Perpindahan
1	0		41	20		81	81
2	0		42	20		82	81
3	0		43	23		83	81
4	0		44	23		84	82
5	0		45	23		85	85
6	0		46	23		86	88
7	0		47	25		87	88
8	0		48	25		88	88
9	0		49	25		89	92
10	0		50	27		90	93
11	0		51	27		91	93
12	0		52	27		92	104
13	0		53	27		93	104
14	0		54	34		94	121
15	0		55	35		95	121
16	0		56	35		96	121
17	0		57	37		97	136
18	0		58	38		98	136
19	0		59	56		99	136
20	5		60	56		100	136
21	6		61	56		101	136
22	6		62	56		102	136
23	6		63	56		103	142
24	7		64	56		104	142
25	7		65	56		105	148
26	7		66	57		106	149
27	7		67	62		107	152
28	8		68	62		108	153
29	10		69	64		109	155
30	10		70	64		110	155
31	10		71	64		111	155
32	11		72	65		112	155
33	11		73	66		113	155
34	12		74	67		114	168
35	12		75	67		115	169
36	12		76	75		116	170
37	14		77	76		117	170
38	14		78	76		118	170
39	14		79	76		119	171
40	14		80	76		120	171

Beban	Perpindahan		Beban	Perpindahan
121	174		146	198
122	176		147	198
123	177		148	198
124	177		149	212
125	177		150	216
126	179		151	221
127	182		<p>Beban = @ 1 Kg</p> <p>Beban Total = Beban+berat bak-berat poer = 158.8 Kg</p> <p>Beban=151x1=151kg</p> <p>B.Bak=9.3kg</p> <p>Berat poer=1465 gr</p>	
128	182			
129	182			
130	183			
131	185			
132	185			
133	185			
134	186			
135	188			
136	189			
137	190			
138	195			
139	195			
140	195			
141	196			
142	196			
143	197			
144	197			
145	197			



## Tiang Kelompok Sirip 4D

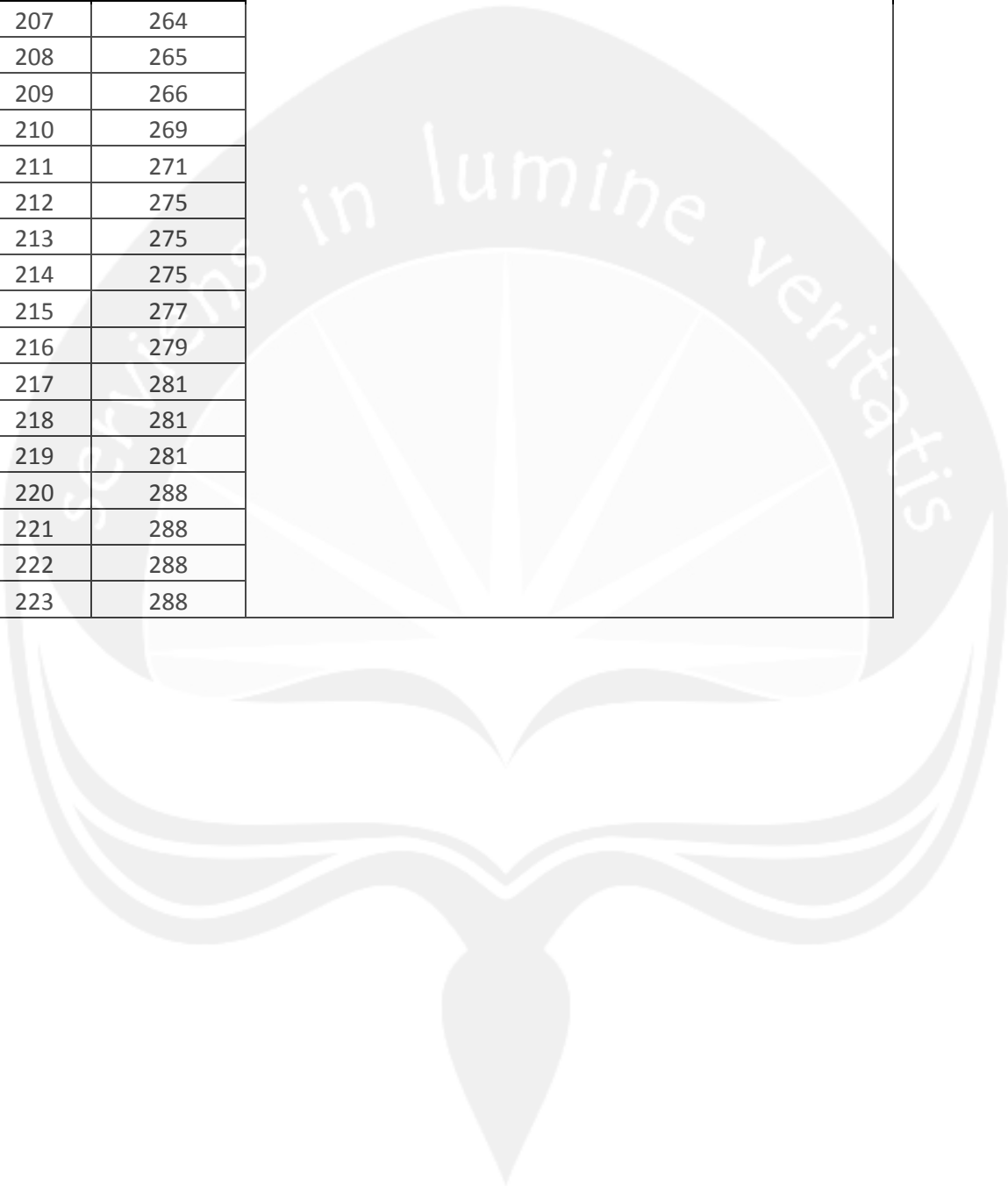
Beban	Perpindahan		Beban	Perpindahan		Beban	Perpindahan
1	0		41	17		81	64
2	0		42	19		82	64
3	0		43	19		83	64
4	0		44	19		84	64
5	1		45	19		85	64
6	1		46	21		86	64
7	1		47	25		87	65
8	1		48	26		88	65
9	1		49	26		89	65
10	1		50	26		90	65
11	2		51	26		91	91
12	2		52	26		92	93
13	3		53	32		93	93
14	3		54	32		94	93
15	5		55	32		95	94
16	4		56	35		96	107
17	5		57	35		97	107
18	5		58	35		98	107
19	6		59	35		99	107
20	6		60	35		100	107
21	6		61	36		101	108
22	6		62	37		102	115
23	6		63	37		103	115
24	7		64	37		104	115
25	7		65	37		105	115
26	7		66	37		106	115
27	7		67	37		107	115
28	8		68	57		108	116
29	8		69	58		109	117
30	8		70	58		110	117
31	9		71	58		111	118
32	10		72	60		112	118
33	11		73	60		113	118
34	12		74	60		114	118
35	13		75	61		115	120
36	15		76	62		116	120
37	16		77	62		117	121
38	17		78	62		118	122
39	17		79	62		119	123
40	17		80	62		120	124

Beban	Perpindahan		Beban	Perpindahan
121	125		161	200
122	125		162	203
123	125		163	205
124	125		164	205
125	125		165	205
126	140		166	205
127	140		167	206
128	140		168	208
129	140		169	208
130	141		170	209
131	142		171	210
132	144		172	215
133	144		173	215
134	144		174	215
135	144		175	217
136	145		176	219
137	146		177	219
138	154		178	219
139	154		179	221
140	170		180	224
141	170		181	224
142	170		182	225
143	170		183	227
144	170		184	227
145	172		185	227
146	172		186	231
147	173		187	231
148	173		188	231
149	173			
150	174		Beban = @ 1 Kg Beban Total = Beban+berat bak-berat poer = 195.8 Kg Beban=188x1=188kg B.Bak=9.3kg Berat poer=1465 gr	
151	182			
152	183			
153	183			
154	183			
155	183			
156	186			
157	188			
158	190			
159	190			
160	191			

## Tiang Kelompok Sirip 5D

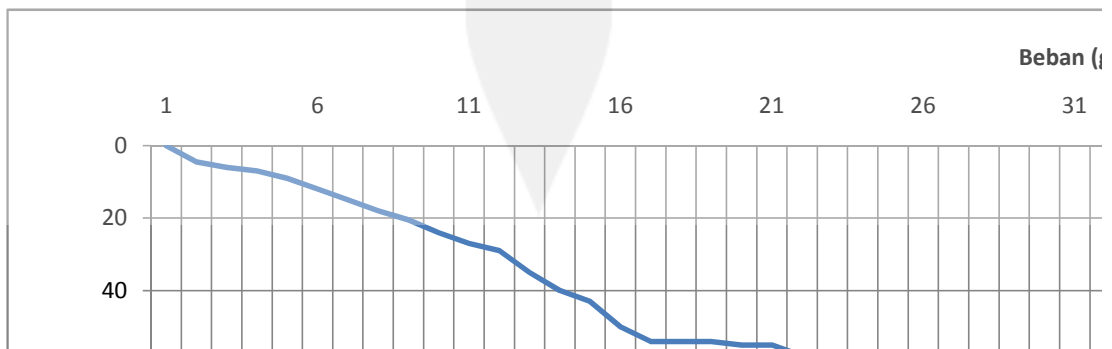
Beban	Perpindahan		Beban	Perpindahan		Beban	Perpindahan		Beban	Perpindahan
1	0		41	20		81	81		121	125
2	0		42	20		82	81		122	125
3	0		43	23		83	81		123	125
4	0		44	23		84	81		124	125
5	0		45	23		85	81		125	125
6	0		46	23		86	85		126	139
7	0		47	25		87	85		127	139
8	0		48	25		88	86		128	139
9	0		49	25		89	87		129	142
10	0		50	27		90	91		130	142
11	0		51	27		91	91		131	142
12	0		52	27		92	94		132	143
13	0		53	27		93	94		133	143
14	0		54	34		94	94		134	143
15	0		55	35		95	95		135	145
16	0		56	35		96	106		136	145
17	0		57	37		97	107		137	147
18	0		58	38		98	107		138	151
19	0		59	56		99	107		139	151
20	5		60	56		100	108		140	167
21	6		61	56		101	108		141	167
22	6		62	56		102	114		142	171
23	6		63	56		103	115		143	171
24	7		64	56		104	115		144	171
25	7		65	56		105	115		145	172
26	7		66	57		106	116		146	172
27	7		67	62		107	116		147	173
28	8		68	62		108	116		148	173
29	10		69	64		109	117		149	173
30	10		70	64		110	117		150	174
31	10		71	64		111	118		151	183
32	11		72	65		112	119		152	183
33	11		73	66		113	119		153	183
34	12		74	67		114	119		154	184
35	12		75	67		115	120		155	184
36	12		76	75		116	120		156	186
37	14		77	76		117	121		157	188
38	14		78	76		118	122		158	189
39	14		79	76		119	124		159	189
40	14		80	76		120	124		160	193

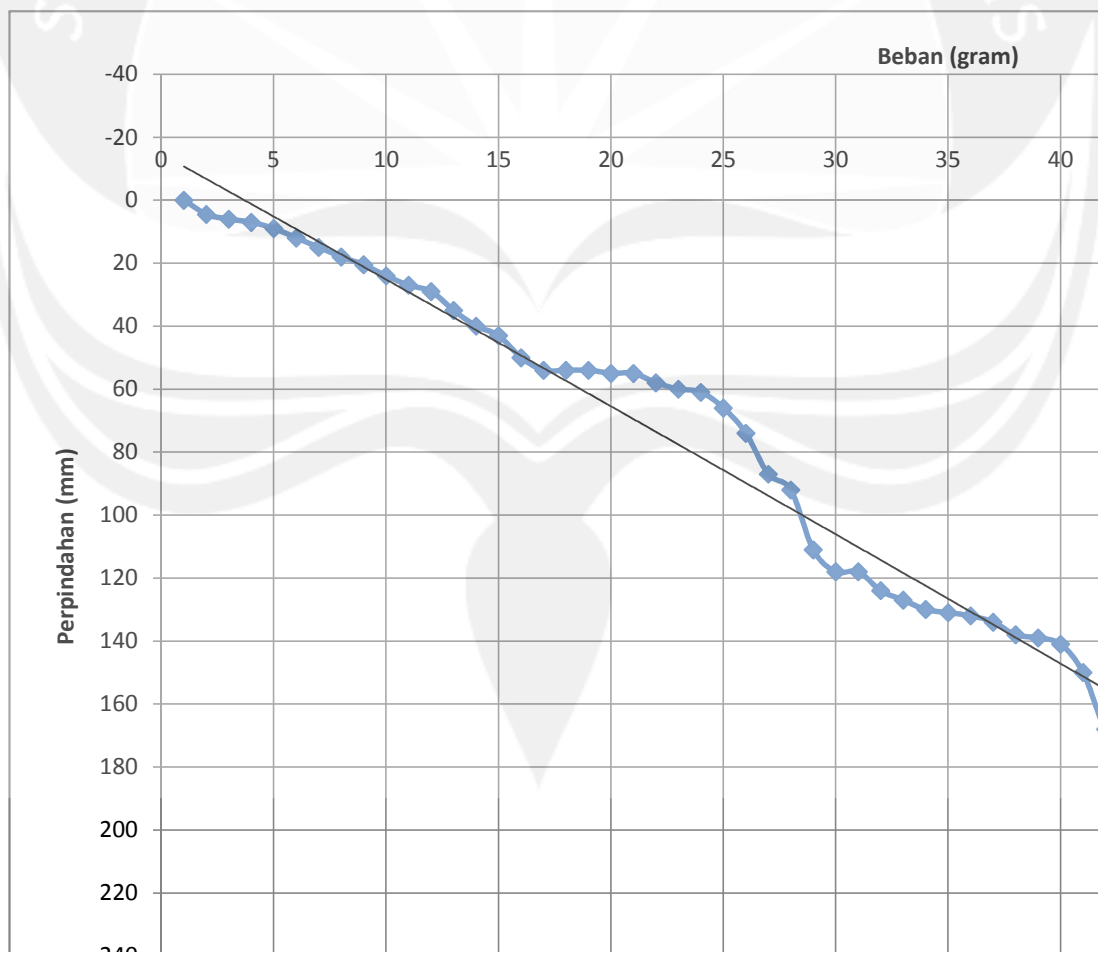
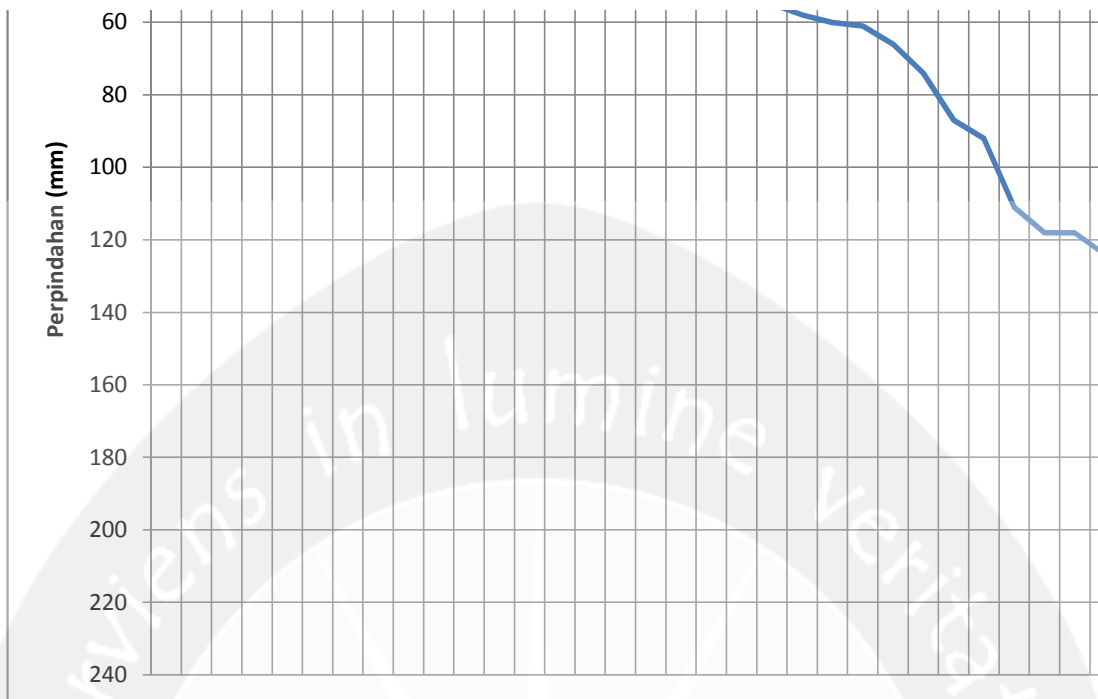
201	258	Beban = @ 1 Kg Beban Total = Beban+berat bak-berat poer = 230.835 Kg Beban=223x1=223kg B.Bak=9.3kg Berat poer=1465 gr
202	258	
203	259	
204	260	
205	261	
206	264	
207	264	
208	265	
209	266	
210	269	
211	271	
212	275	
213	275	
214	275	
215	277	
216	279	
217	281	
218	281	
219	281	
220	288	
221	288	
222	288	
223	288	





Beban	Perpindahan	Beban	Perpindahan
1	0	31	118
2	4,5	32	124
3	6	33	127
4	7	34	130
5	9	35	131
6	12	36	132
7	15	37	134
8	18	38	138
9	20,5	39	139
10	24	40	141
11	27	41	150
12	29	42	168
13	35	43	173
14	40	44	174
15	43	45	180
16	50	46	185
17	54	47	185
18	54	48	185
19	54	49	188
20	55	50	190
21	55	51	208
22	58	52	208
23	60	53	208
24	61	54	210
25	66	55	213
26	74	56	213
27	87	57	214
28	92	58	215
29	111	59	217
30	118	60	217
		61	217
		62	223





240

260





Beban = @200 gram

Beban Total = Beban+berat ember-berat poer

**12,556 Kg**

Beban=62x200=12.4kg

B.ember=312 gr

Berat poer=156 gr



gram)

36

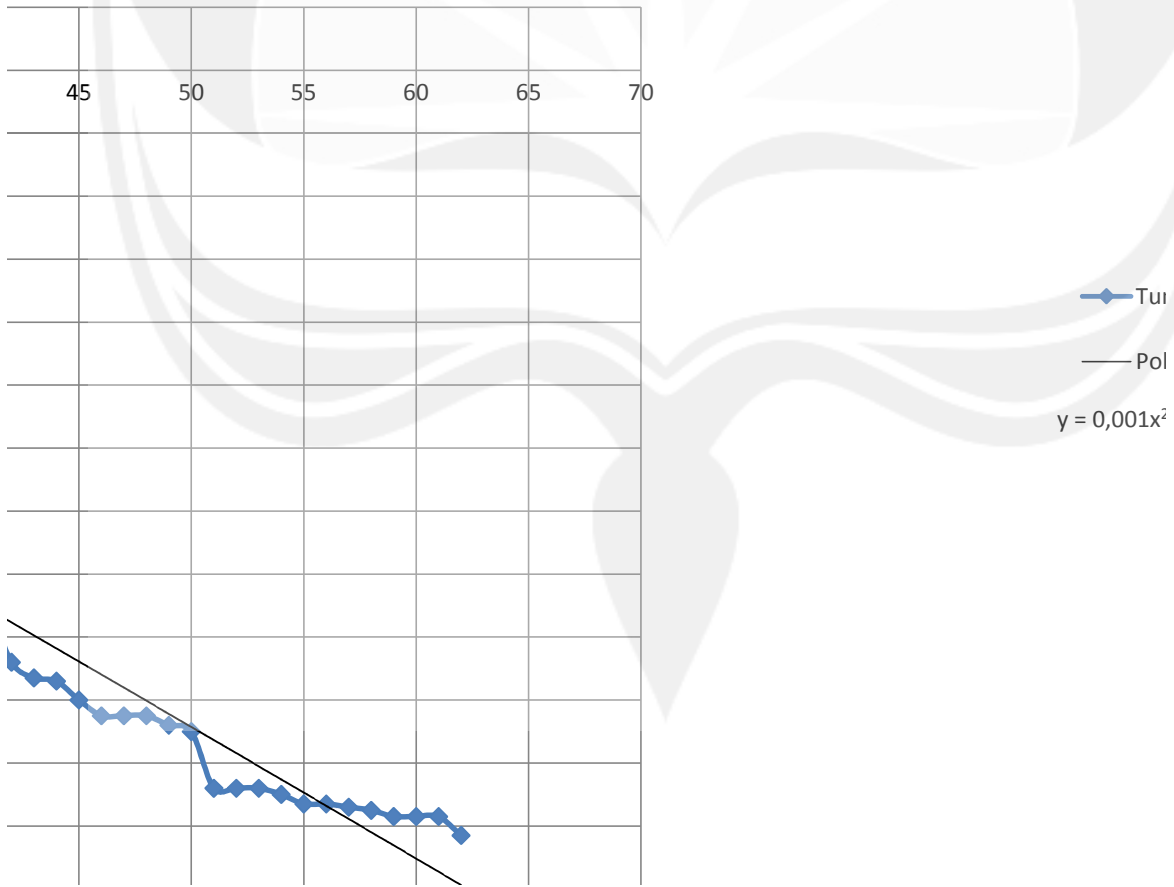
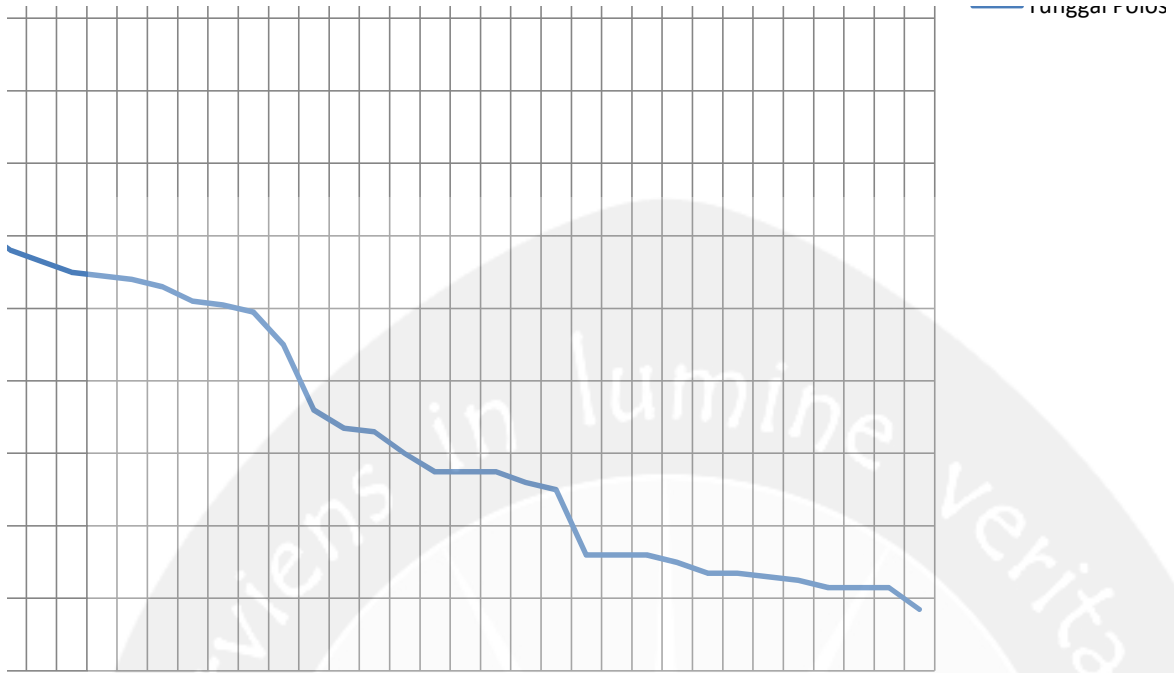
41

46

51

56

61

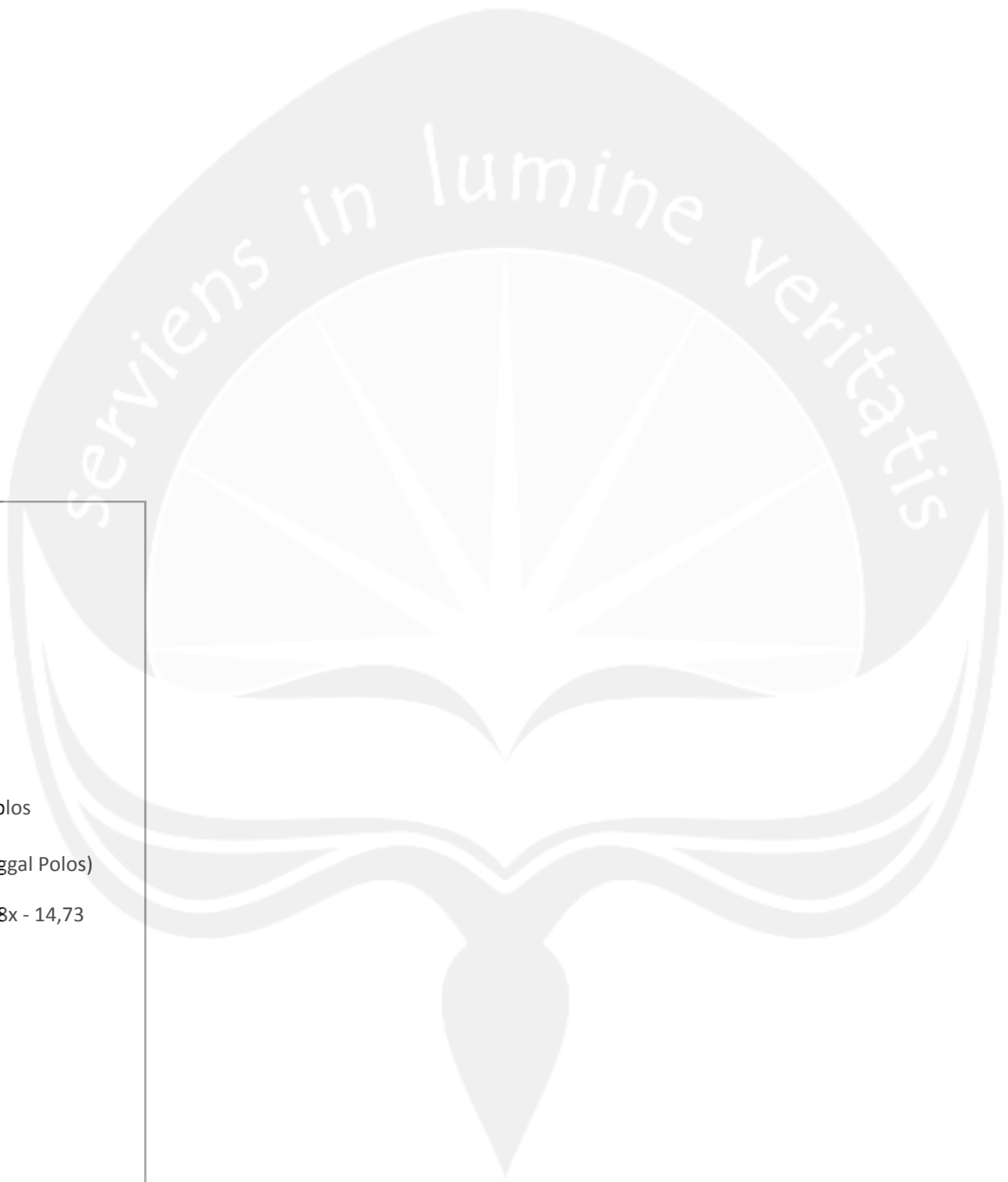



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1



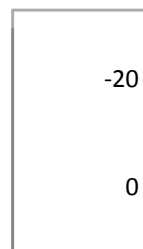
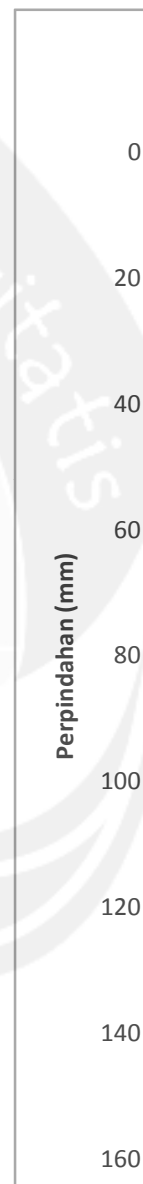
nggal Polos

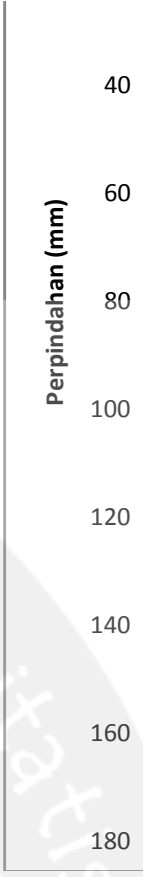
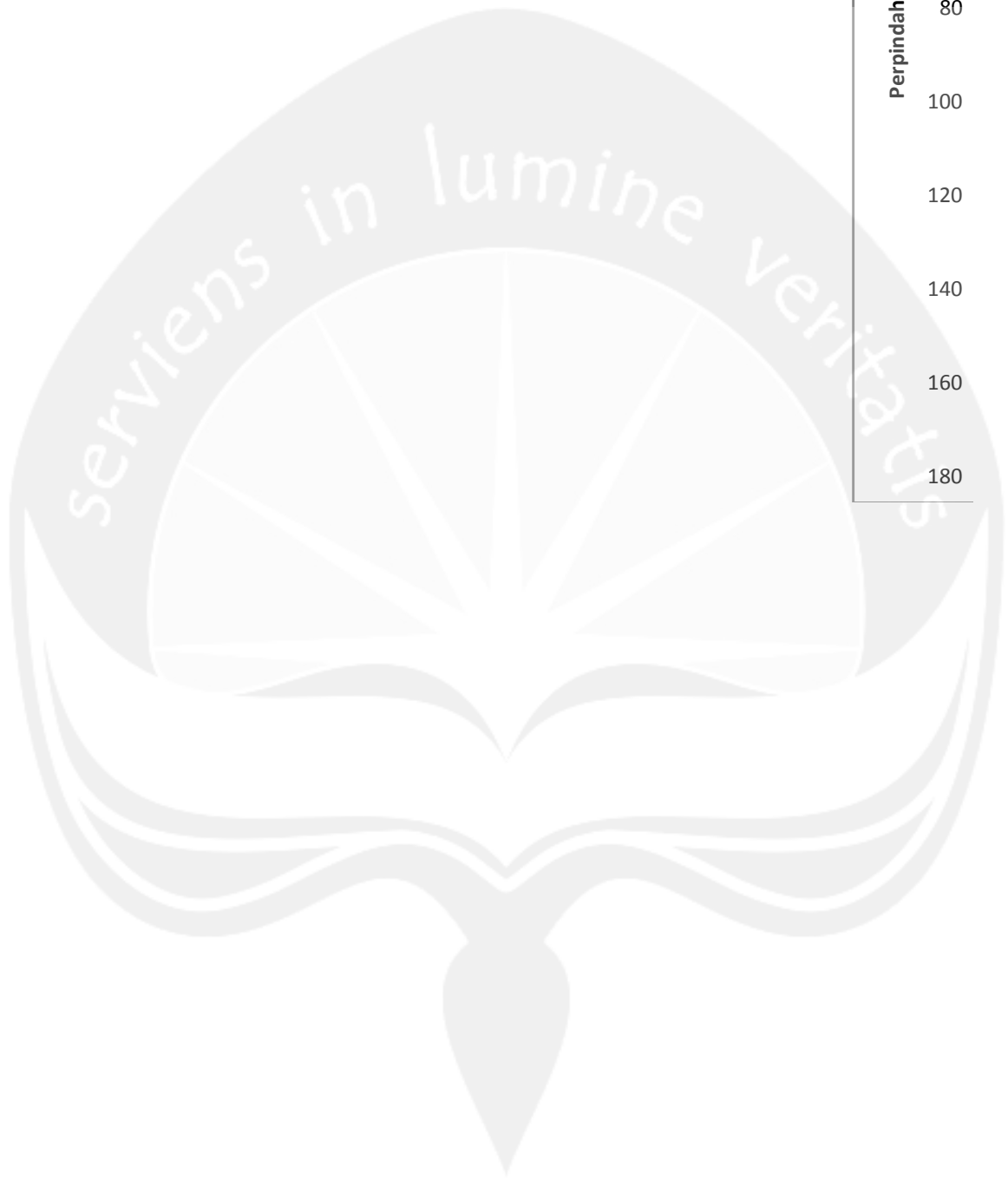
ly. (Tunggal Polos)

$x^2 + 3,968x - 14,73$



Beban	Perpindahan	Beban	Perpindahan
1	0	31	53
2	0	32	57
3	0	33	60
4	0	34	60
5	0	35	60
6	0	36	60
7	0	37	64
8	0	38	64
9	0	39	64
10	4	40	65
11	7	41	67
12	10	42	67
13	13	43	71
14	16	44	76
15	19	45	81
16	21	46	107
17	23	47	119
18	24,5	48	135
19	26	49	135
20	29	50	135
21	32	51	142
22	34	52	143
23	40	53	145
24	40	54	146
25	40	55	147
26	40	56	147
27	45	57	150
28	48	58	151
29	49	59	151
30	53	60	151







Beban = @1 Kg

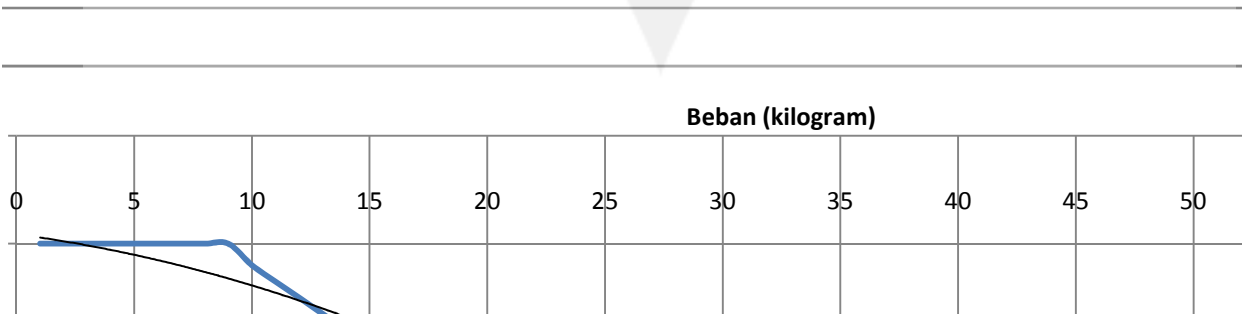
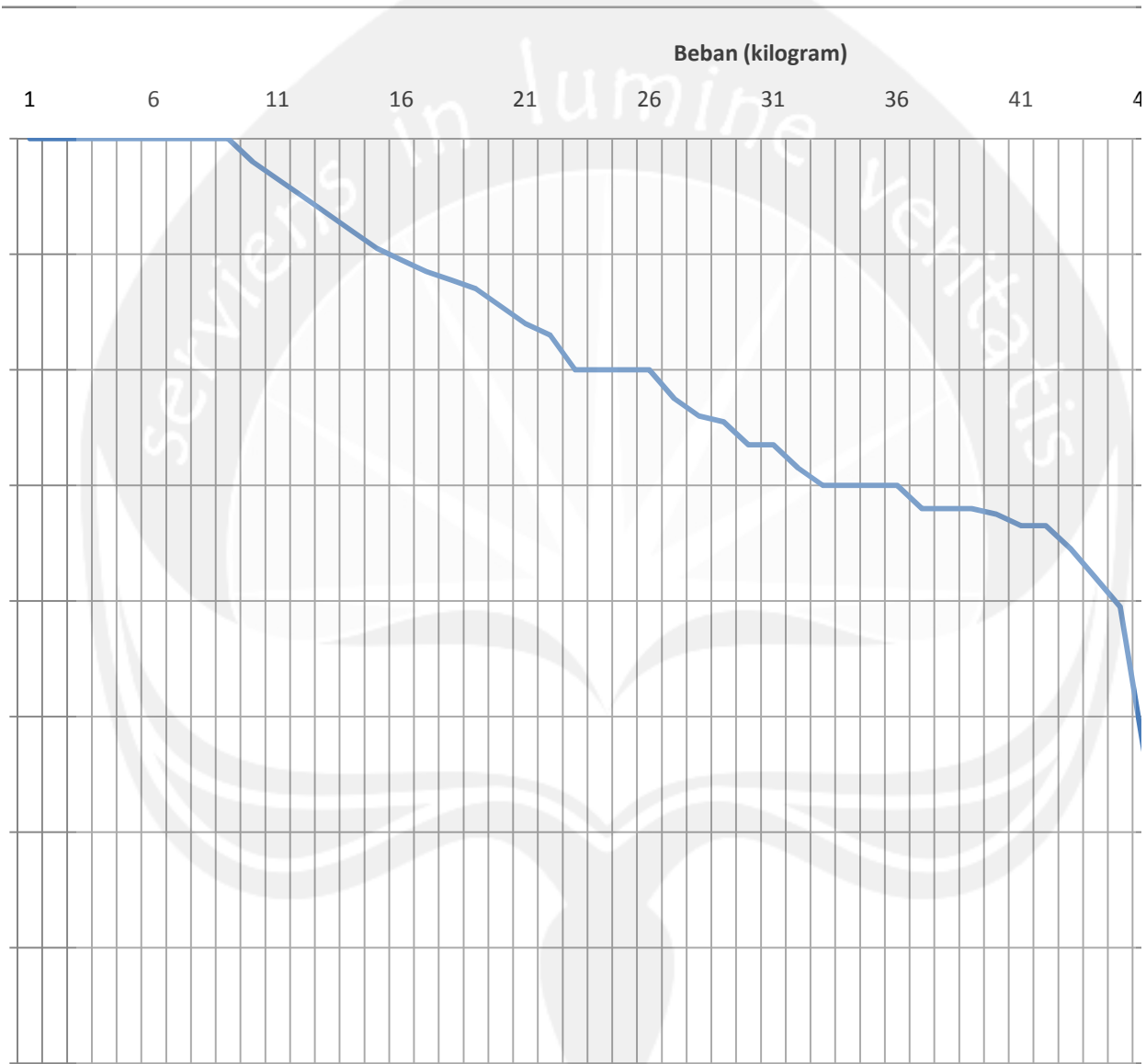
Beban Total = Beban+berat bak-berat poer

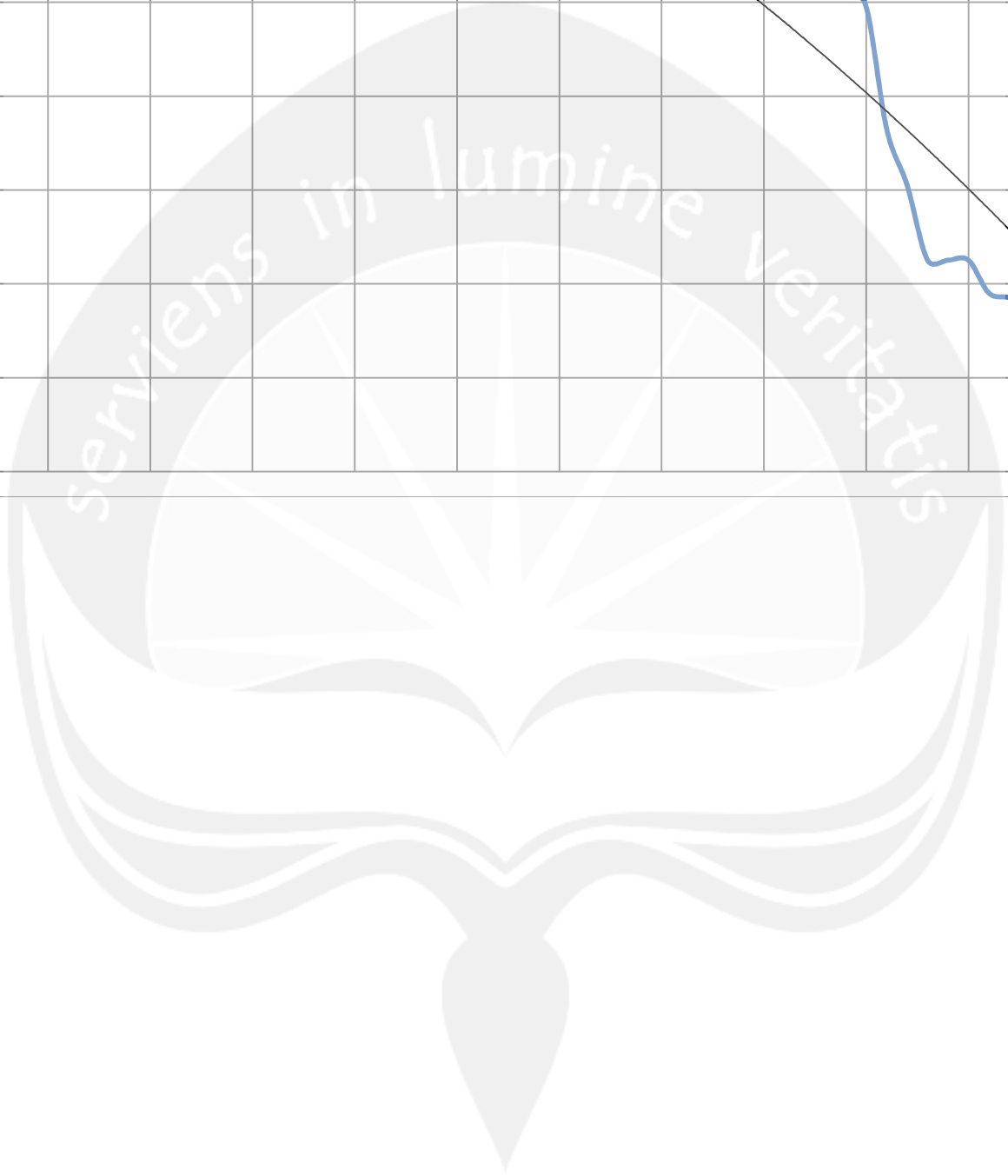
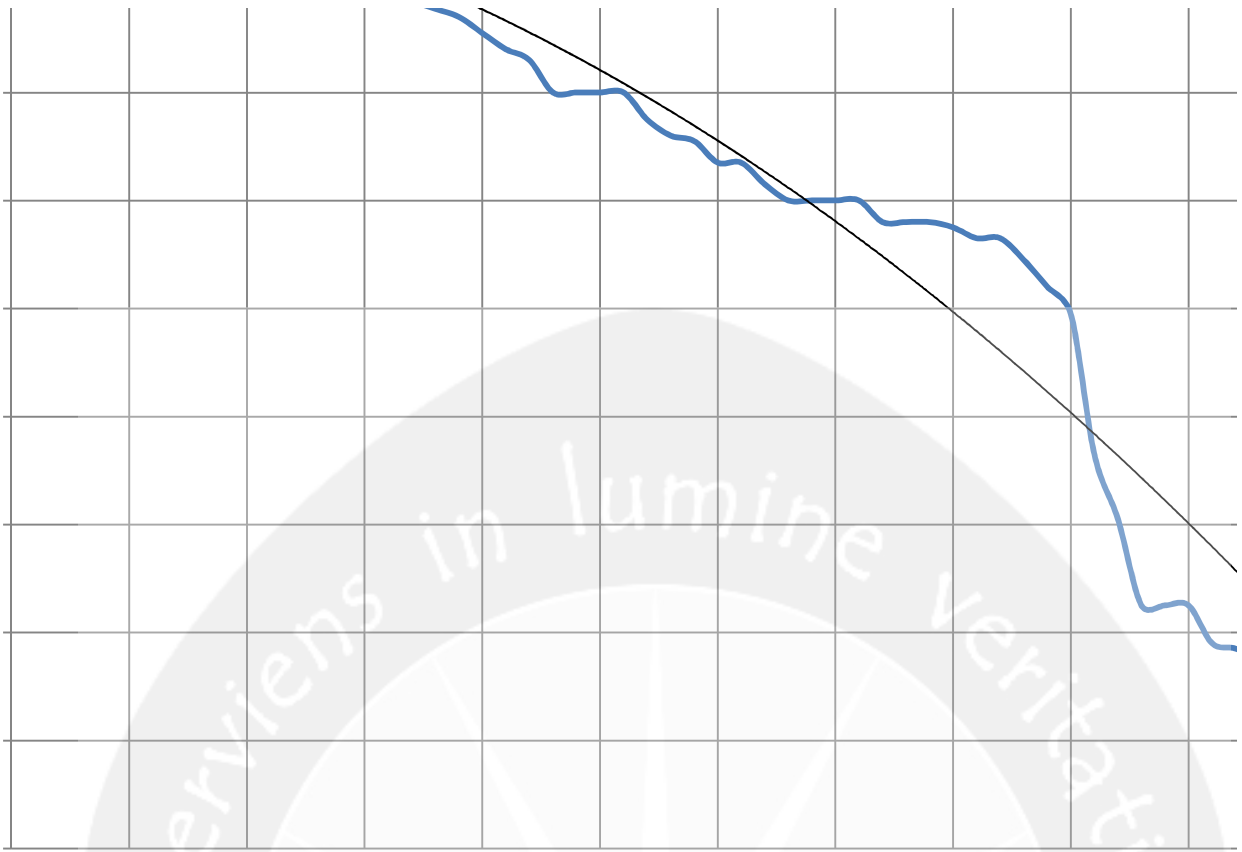
**69,144 Kg**

Beban=60x1=60kg

B.Bak=9.3kg

Berat poer=156 gr



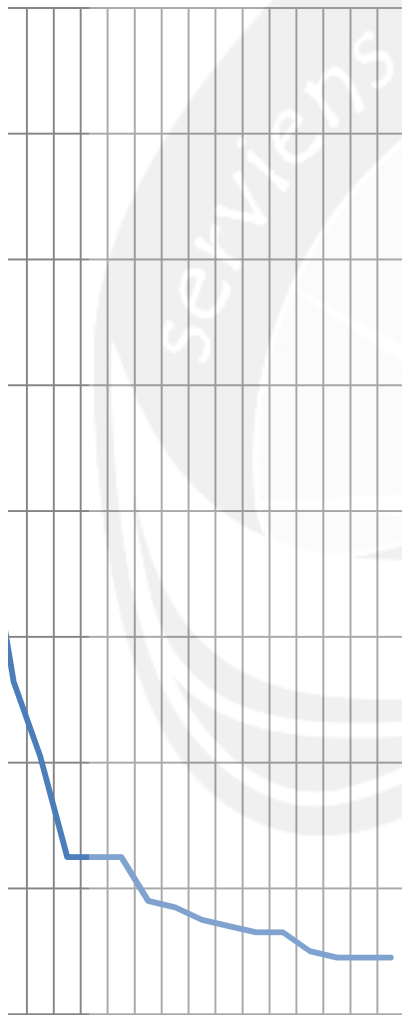


serviens in lumine veritatis

16

51

56

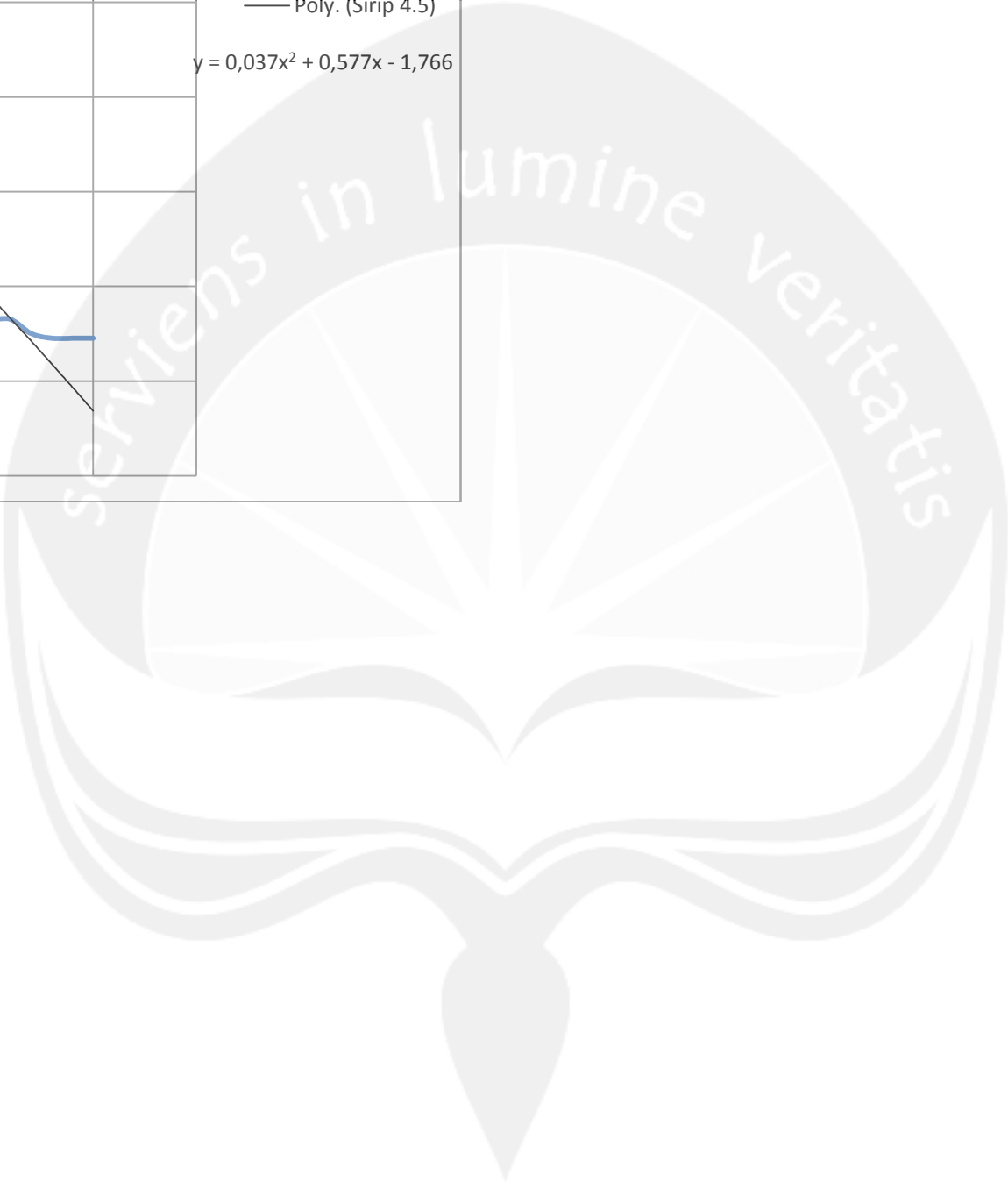
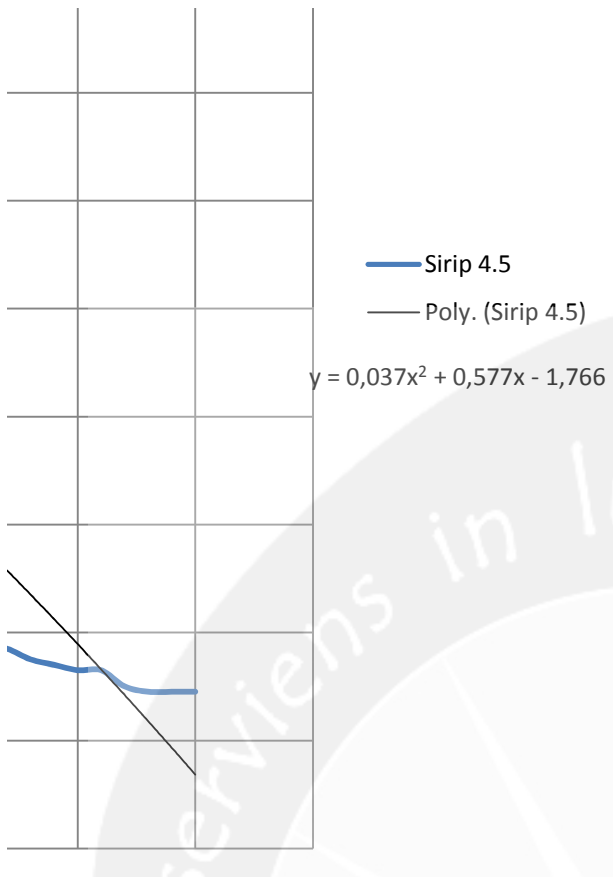


— Sirip 4.5

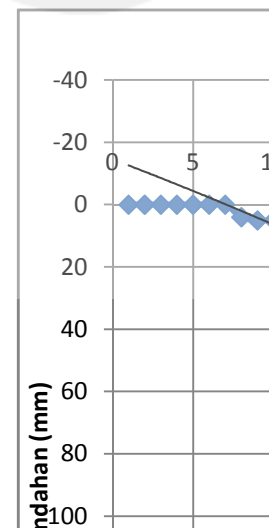
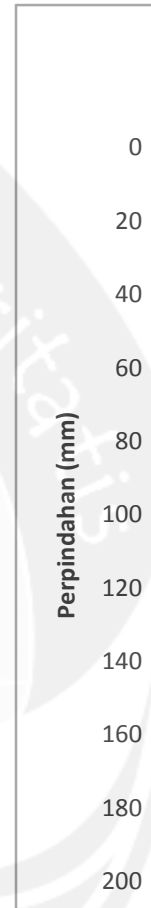
55

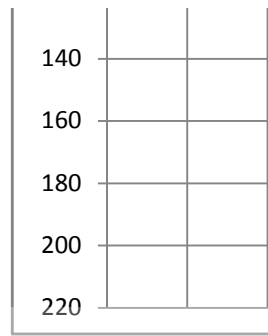
60

65



Beban	Perpindahan	Beban	Perpindahan
1	0	41	81
2	0	42	84
3	0	43	85
4	0	44	111
5	0	45	114
6	0	46	124
7	0	47	125
8	4	48	125
9	5	49	125
10	5	50	127
11	5	51	128
12	6	52	142
13	7	53	145
14	8	54	145
15	15	55	145
16	20	56	148
17	25	57	149
18	33	58	150
19	34	59	163
20	35	60	163
21	36	61	163
22	38	62	163
23	38	63	171
24	38	64	173
25	40	65	173
26	40	66	173
27	42	67	174
28	42	68	175
29	42	69	175
30	42	70	175
31	45	71	175
32	50	72	176
33	50	73	176
34	50	74	176
35	59		
36	60		
37	61		
38	62		
39	63		
40	64		





Beban = @1 Kg

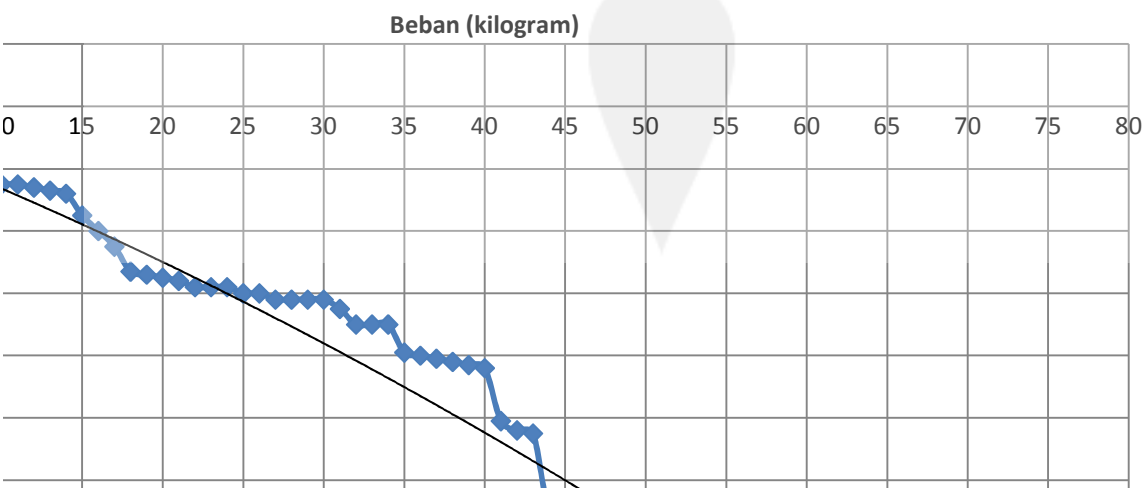
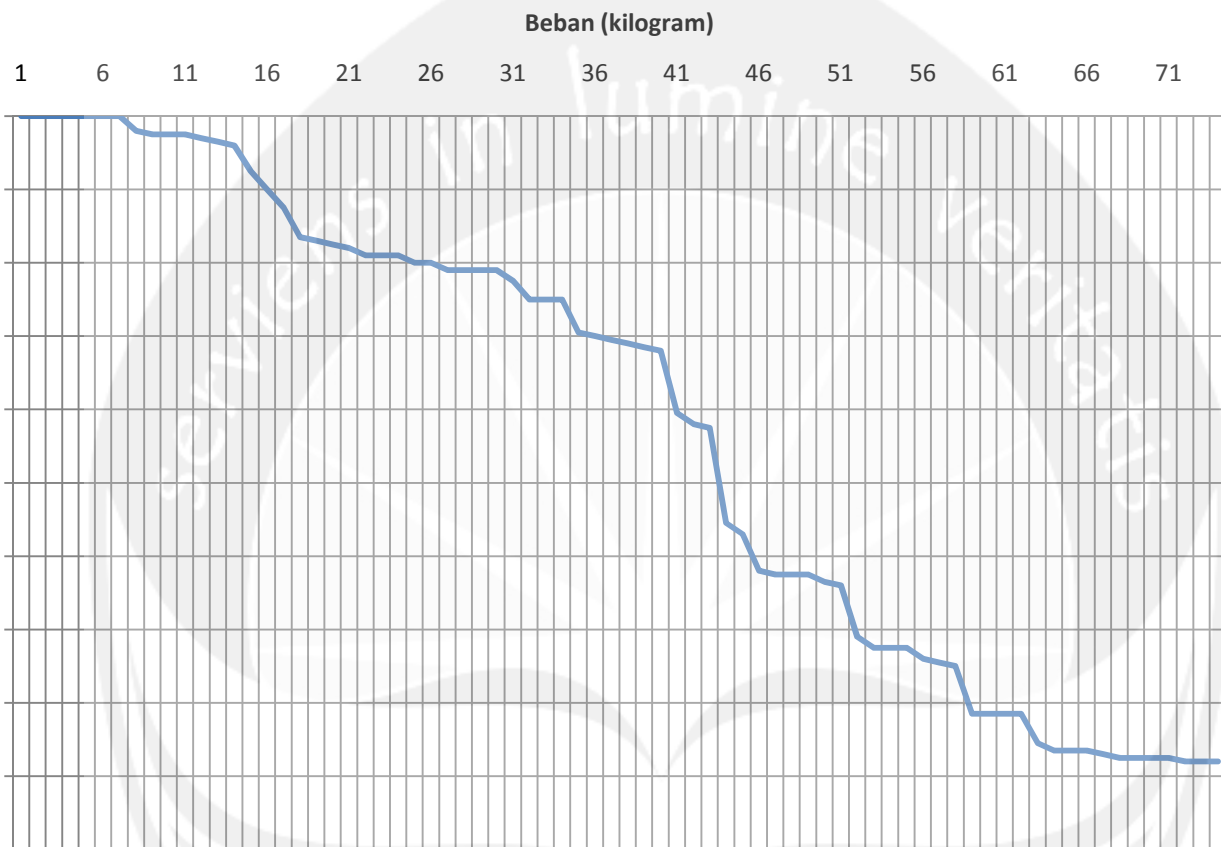
Beban Total = Beban+berat bak-berat poer

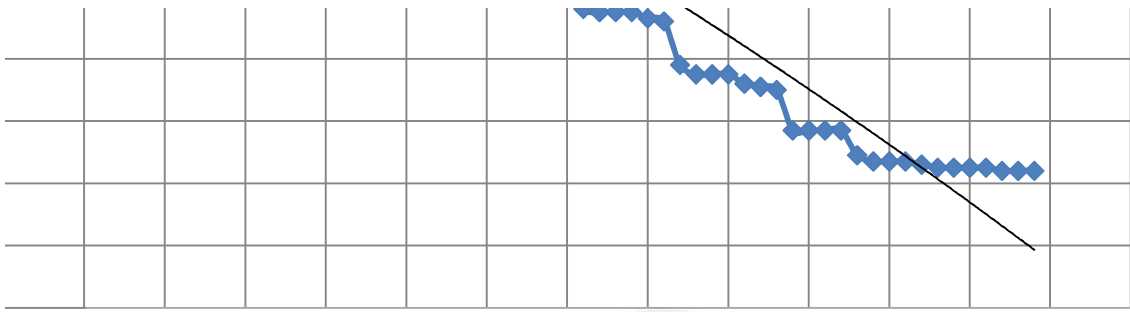
**83,144 Kg**

Beban=74x1=74kg

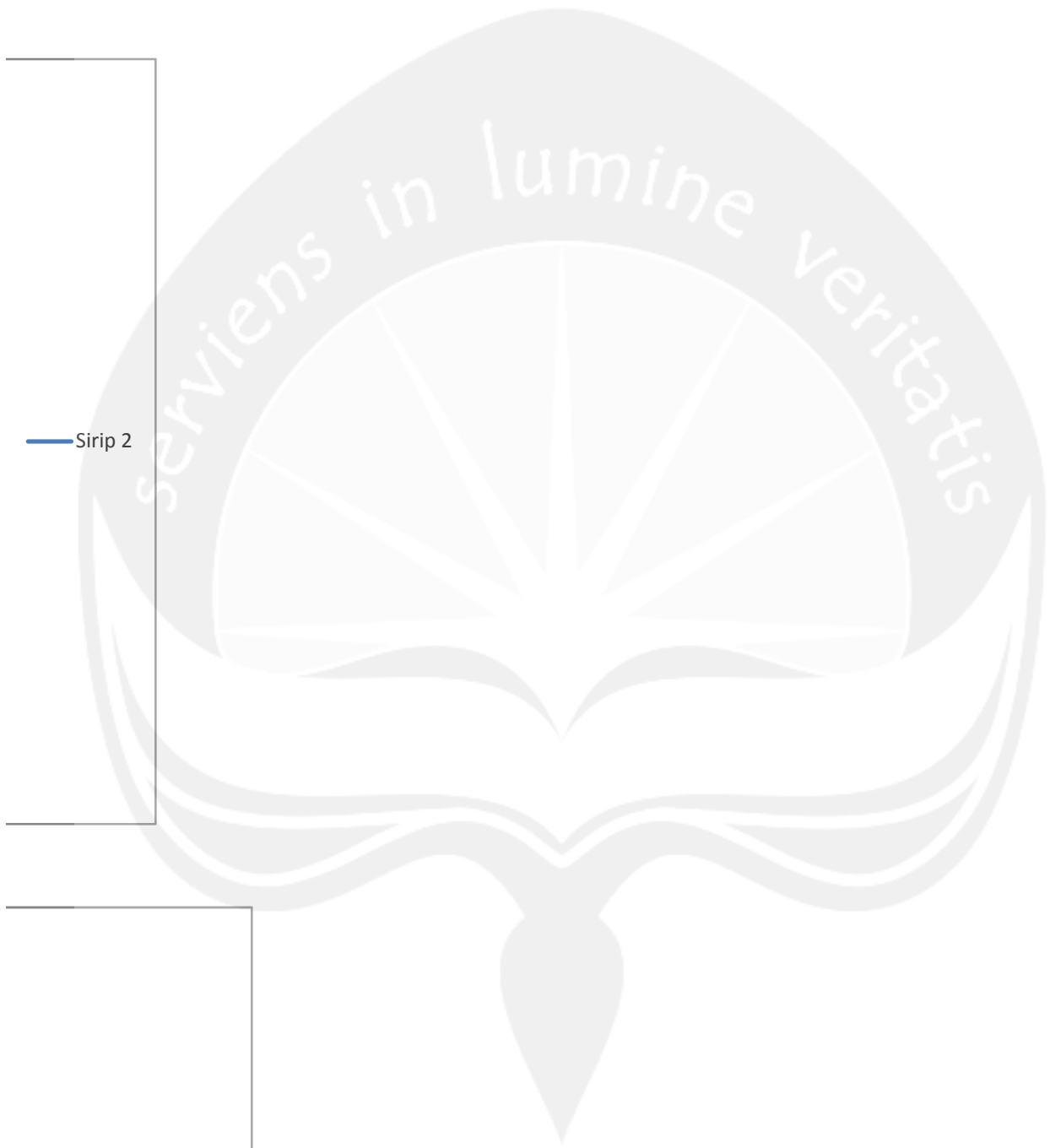
B.Bak=9.3kg

Berat poer=156 gr





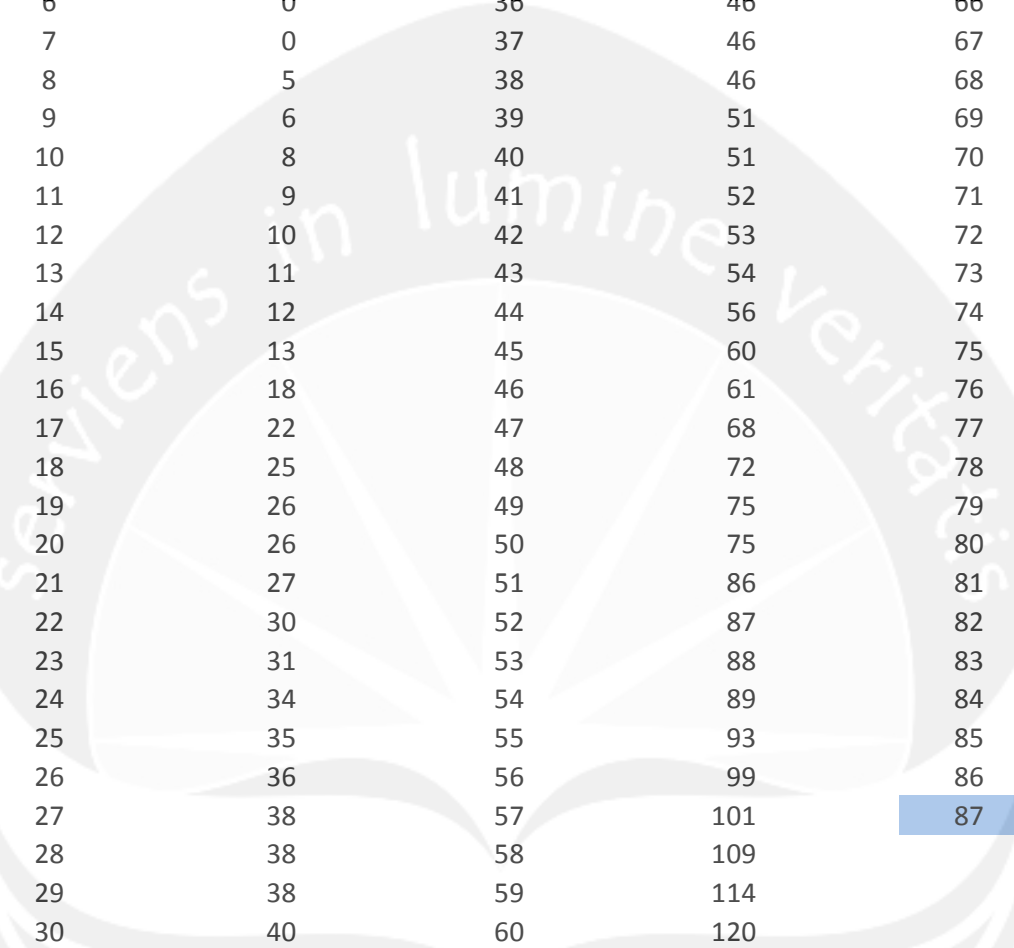




— Sirip 2

—◆ Sirip 2  
— Poly. (Sirip 2)





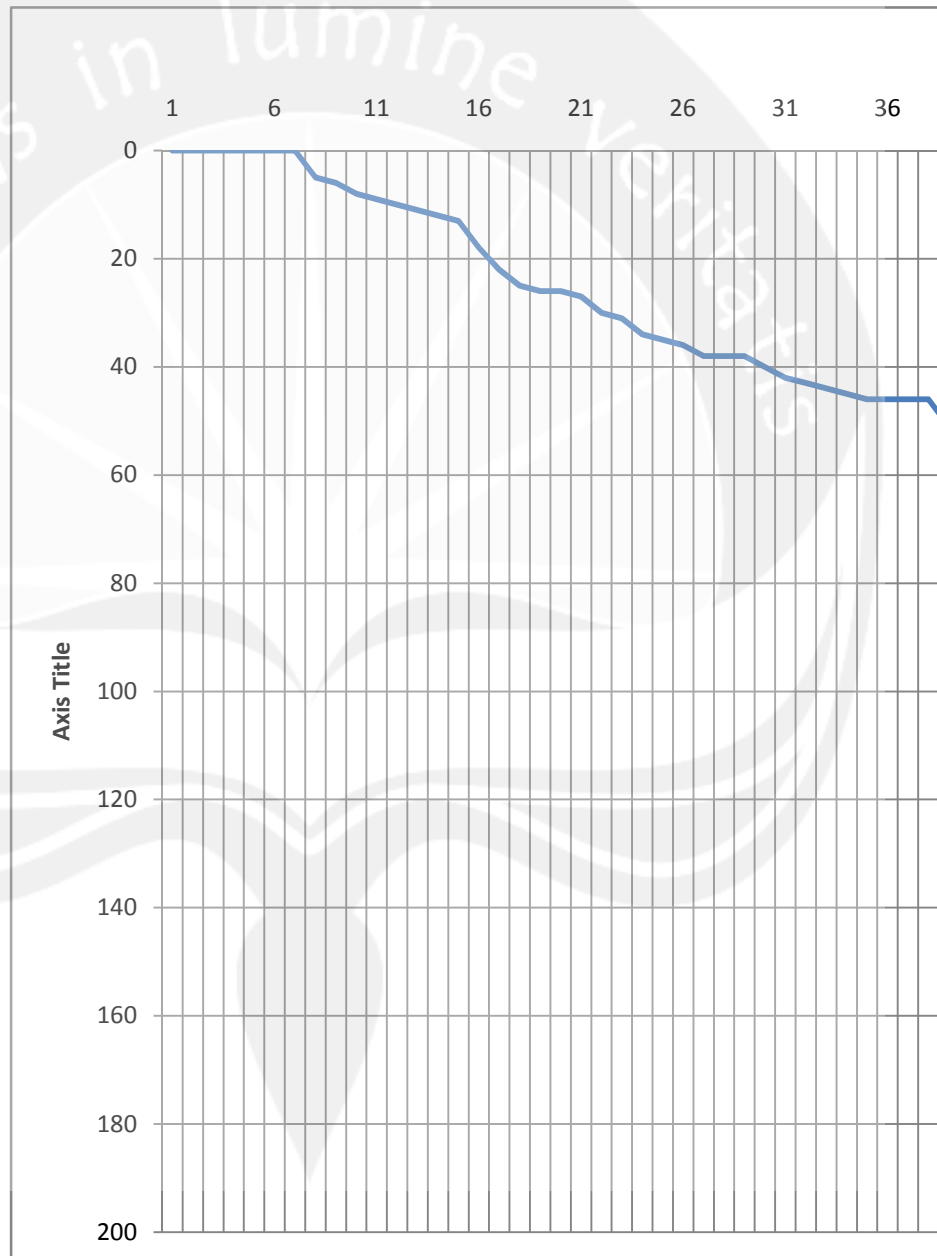
Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	31	42	61
2	0	32	43	62
3	0	33	44	63
4	0	34	45	64
5	0	35	46	65
6	0	36	46	66
7	0	37	46	67
8	5	38	46	68
9	6	39	51	69
10	8	40	51	70
11	9	41	52	71
12	10	42	53	72
13	11	43	54	73
14	12	44	56	74
15	13	45	60	75
16	18	46	61	76
17	22	47	68	77
18	25	48	72	78
19	26	49	75	79
20	26	50	75	80
21	27	51	86	81
22	30	52	87	82
23	31	53	88	83
24	34	54	89	84
25	35	55	93	85
26	36	56	99	86
27	38	57	101	87
28	38	58	109	
29	38	59	114	
30	40	60	120	

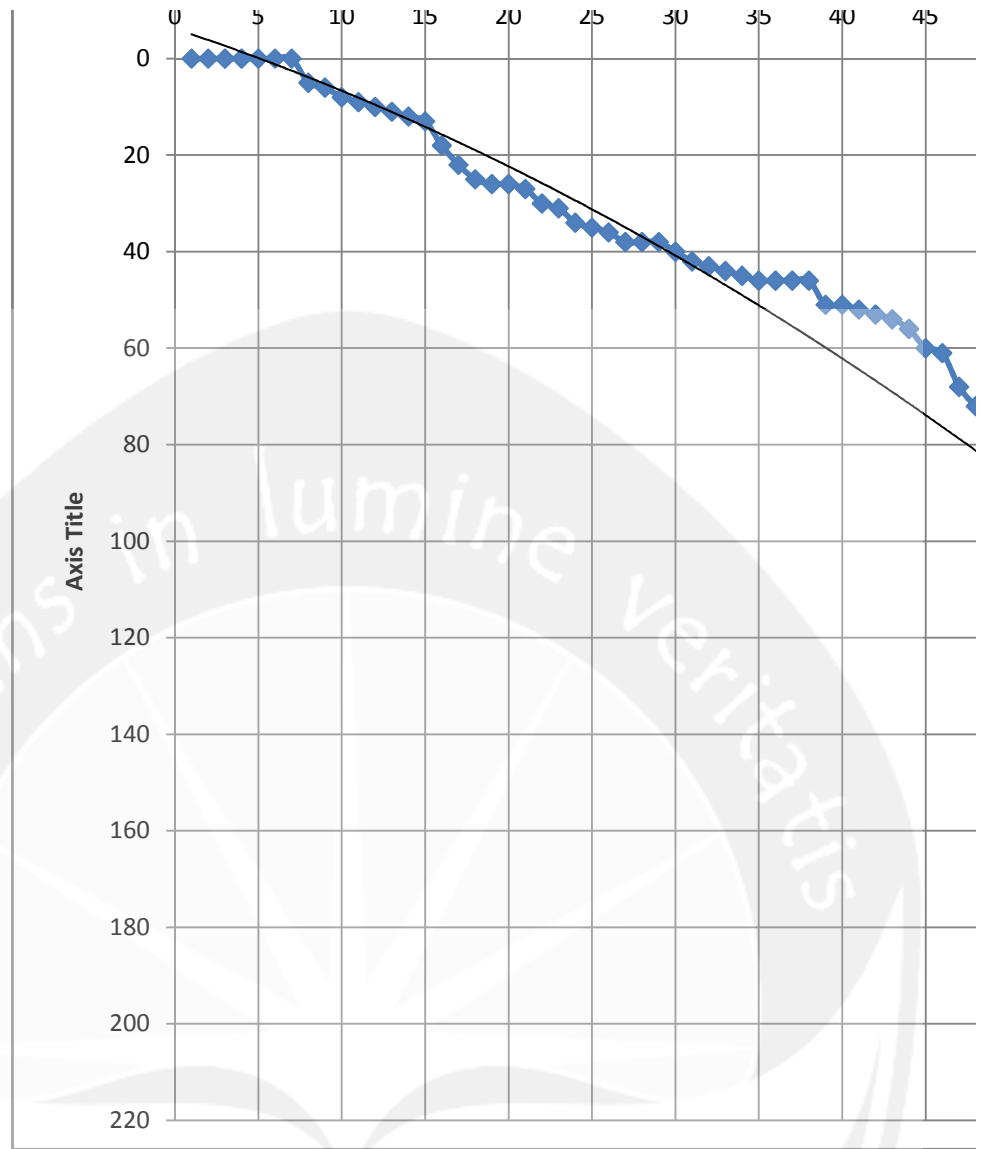


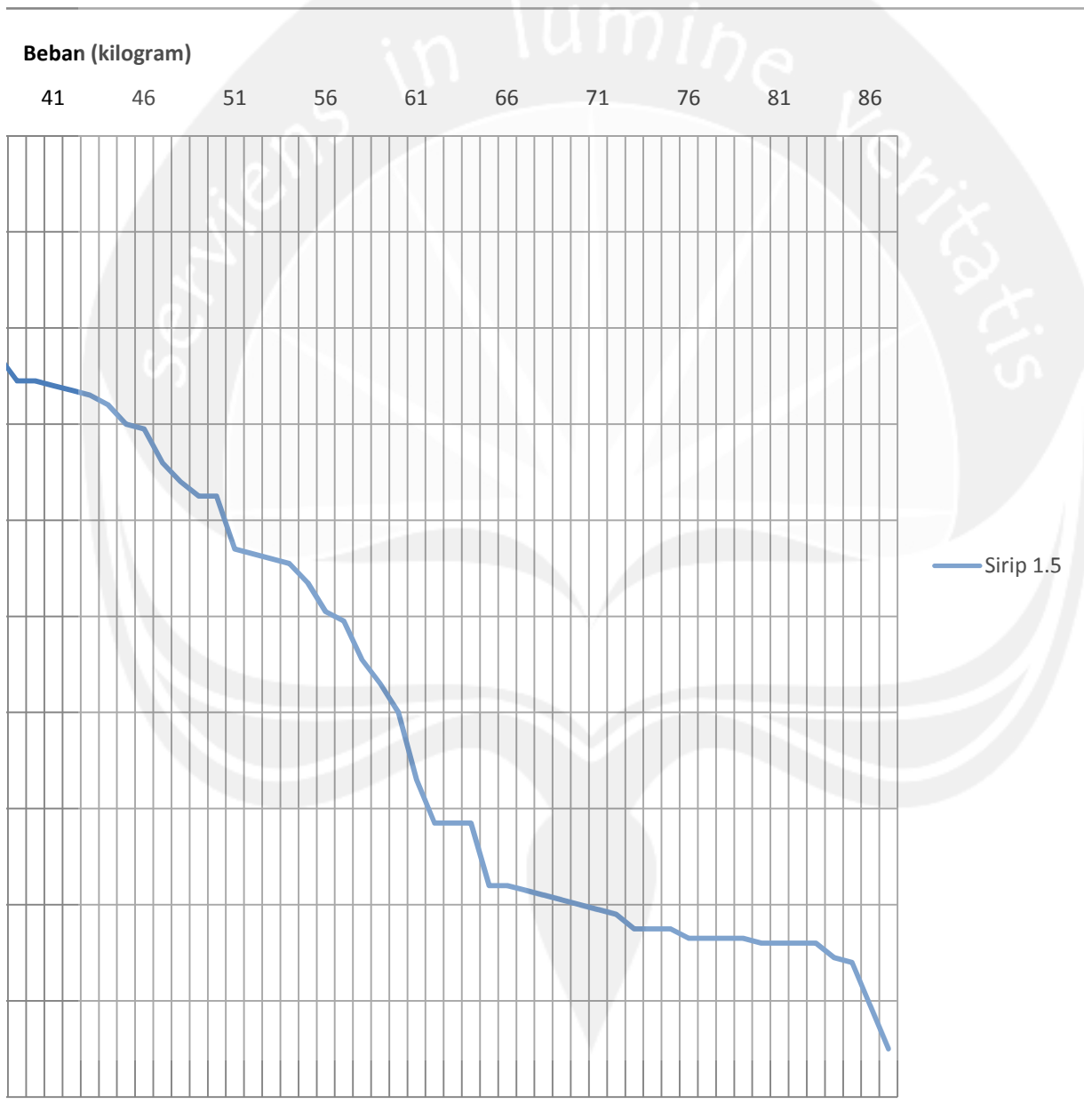
Perpindahan  
134  
143  
143  
143  
156  
156  
157  
158  
159  
160  
161  
162  
165  
165  
165  
167  
167  
167  
167  
168  
168  
168  
168  
171  
172  
181  
190

Beban = @1 Kg  
Beban Total = Beban+berat bak-berat poer  
**96,144 Kg**

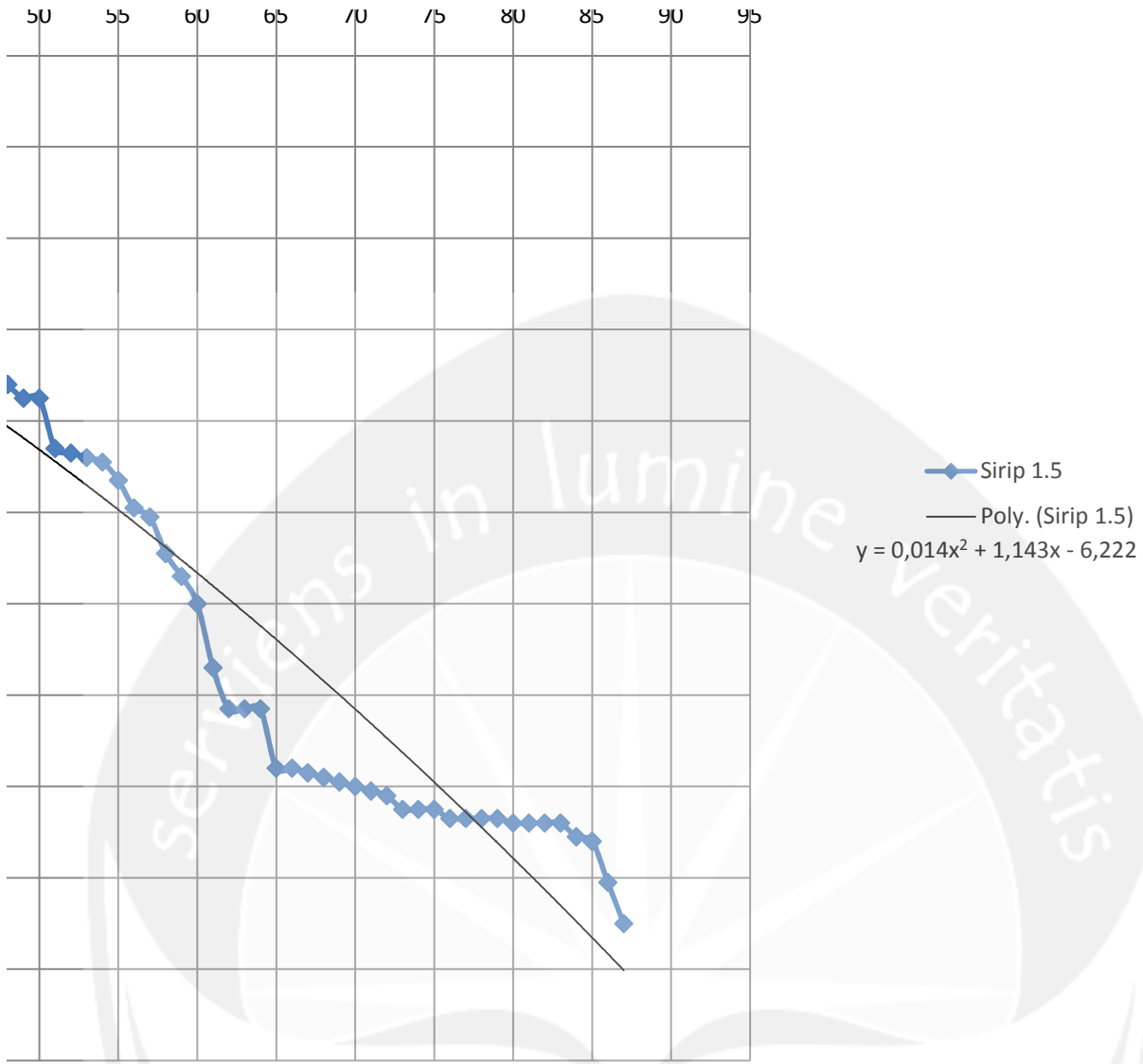
Beban=87x1=87kg  
B.Bak=9.3kg  
Berat poer=156 gr





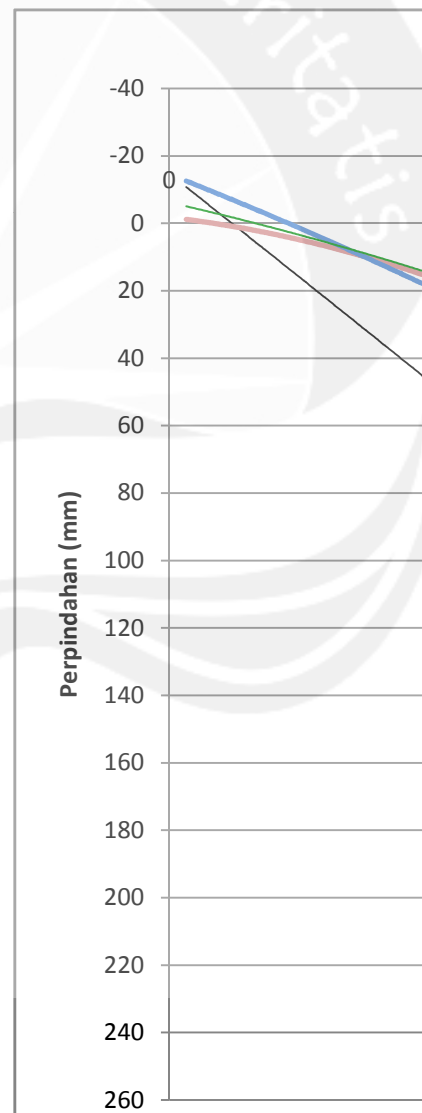


ogram)





jenis tiang	equation	y	1	2	3
polos	$y = 0.001x^2 + 3.968x - 14.73$	x	-10,7619	-6,7936	-2,8251
sirip 4.5	$y = 0.037x^2 + 0.577x - 1.766$	y	1	2	3
		x	-1,152	-0,464	0,298
sirip 2	$y = 0.012x^2 + 1.972x - 14.54$	y	1	2	3
		x	-12,556	-10,6032	-6,76332
sirip 1.5	$y = 0.014x^2 + 1.143x - 6.222$	y	1	2	3
		x	-5,065	-3,88	-2,667

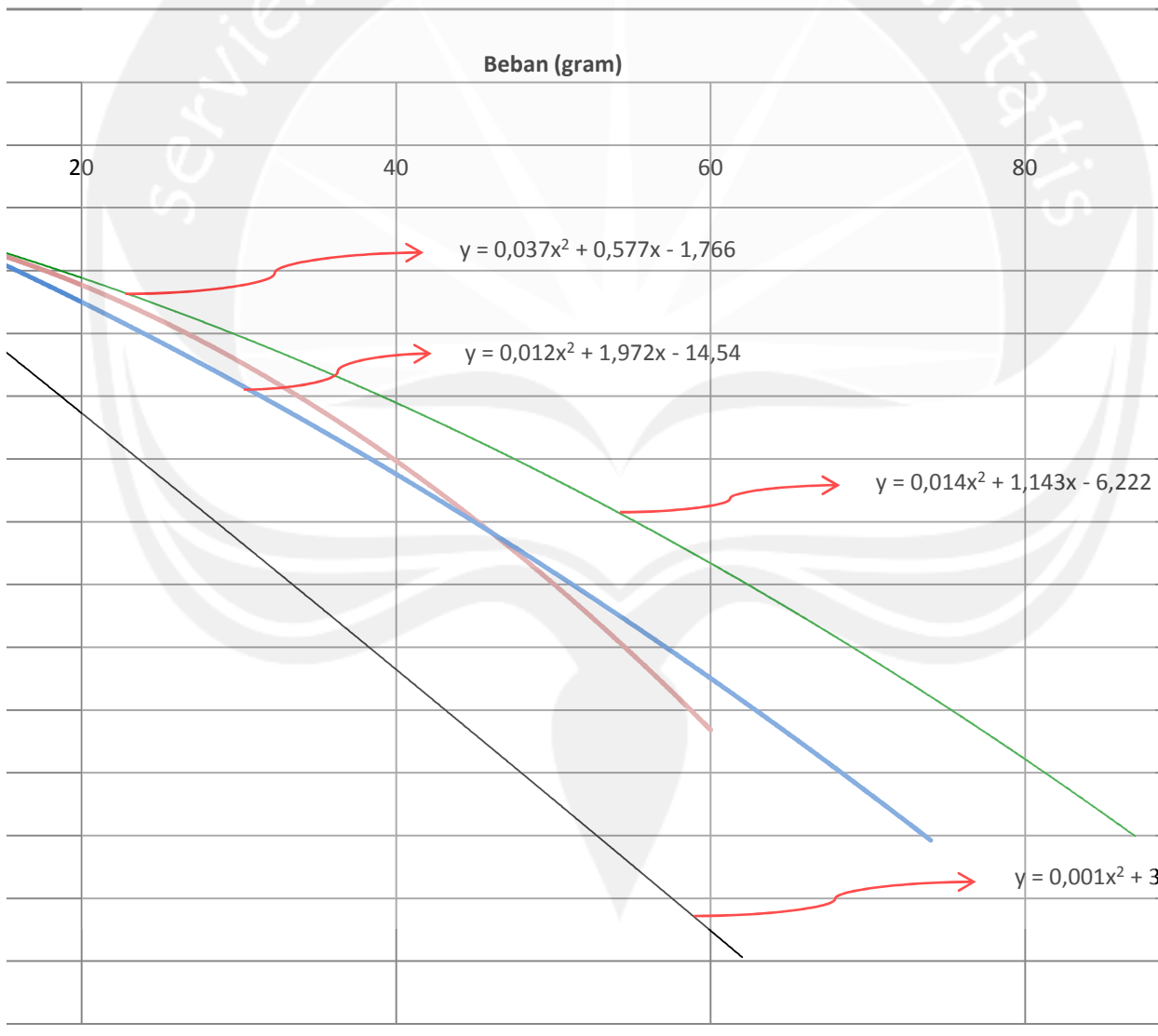


4	5	6	7	8	9	10	11	12
1,1436	5,1125	9,0816	13,0509	17,0204	20,9901	24,96	28,9301	32,9004

4	5	6	7	8	9	10	11	12
1,134	2,044	3,028	4,086	5,218	6,424	7,704	9,058	10,486

4	5	6	7	8	9	10	11	12
0,774641	15,58185	44,70068	102,0187	214,9223	437,4171	876,0026	1740,696	3445,649

4	5	6	7	8	9	10	11	12
-1,426	-0,157	1,14	2,465	3,818	5,199	6,608	8,045	9,51

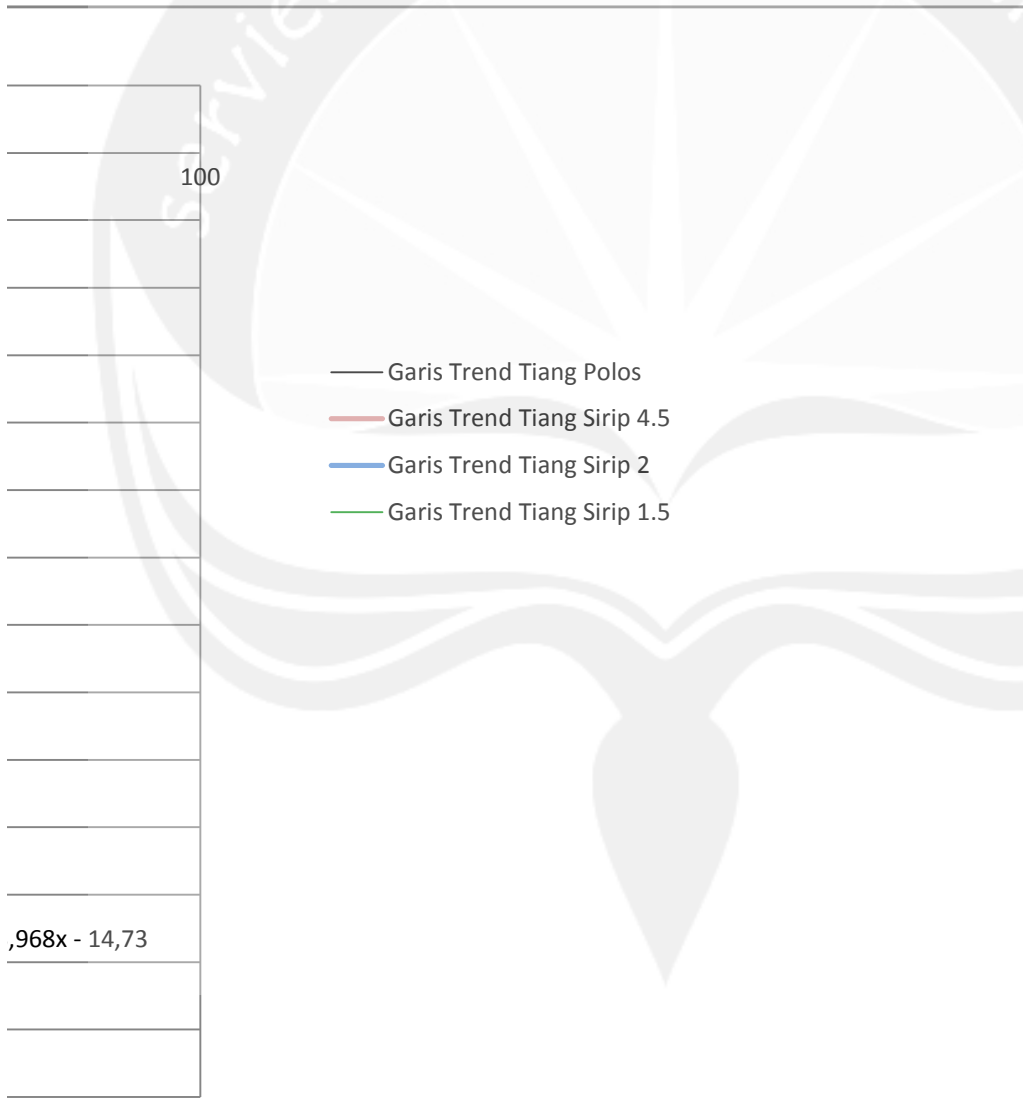


13	14	15	16	17	18	19	20	21
36,8709	40,8416	44,8125	48,7836	52,7549	56,7264	60,6981	64,67	68,6421

13	14	15	16	17	18	19	20	21
11,988	13,564	15,214	16,938	18,736	20,608	22,554	24,574	26,668

13	14	15	16	17	18	19	20	21
6807,574	13437,02	26510	52289,6	103126,6	203376,9	401070,1	790920,6	1559705

13	14	15	16	17	18	19	20	21
11,003	12,524	14,073	15,65	17,255	18,888	20,549	22,238	23,955

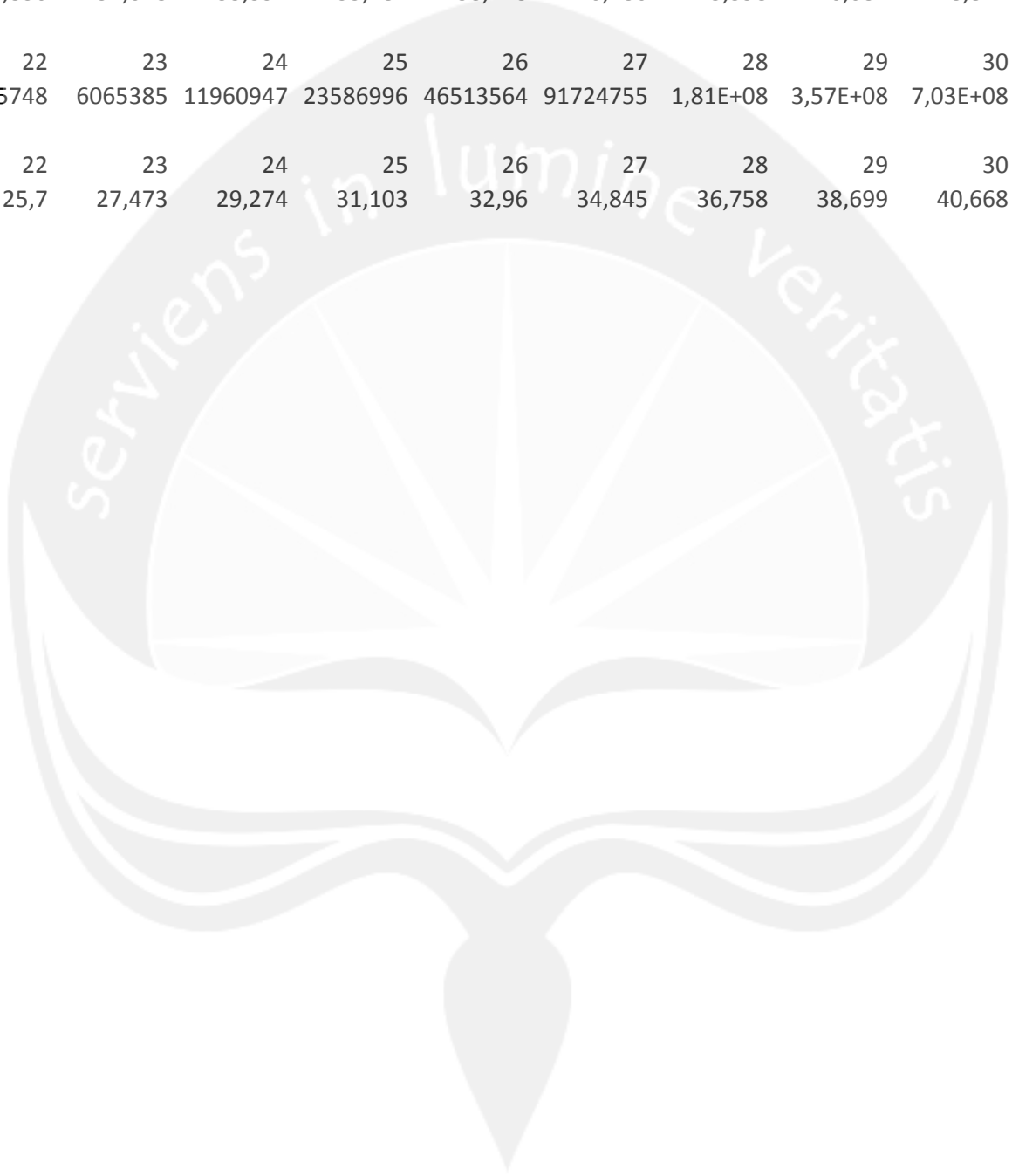


22	23	24	25	26	27	28	29	30
72,6144	76,5869	80,5596	84,5325	88,5056	92,4789	96,4524	100,4261	104,4

22	23	24	25	26	27	28	29	30
28,836	31,078	33,394	35,784	38,248	40,786	43,398	46,084	48,844

22	23	24	25	26	27	28	29	30
3075748	6065385	11960947	23586996	46513564	91724755	1,81E+08	3,57E+08	7,03E+08

22	23	24	25	26	27	28	29	30
25,7	27,473	29,274	31,103	32,96	34,845	36,758	38,699	40,668

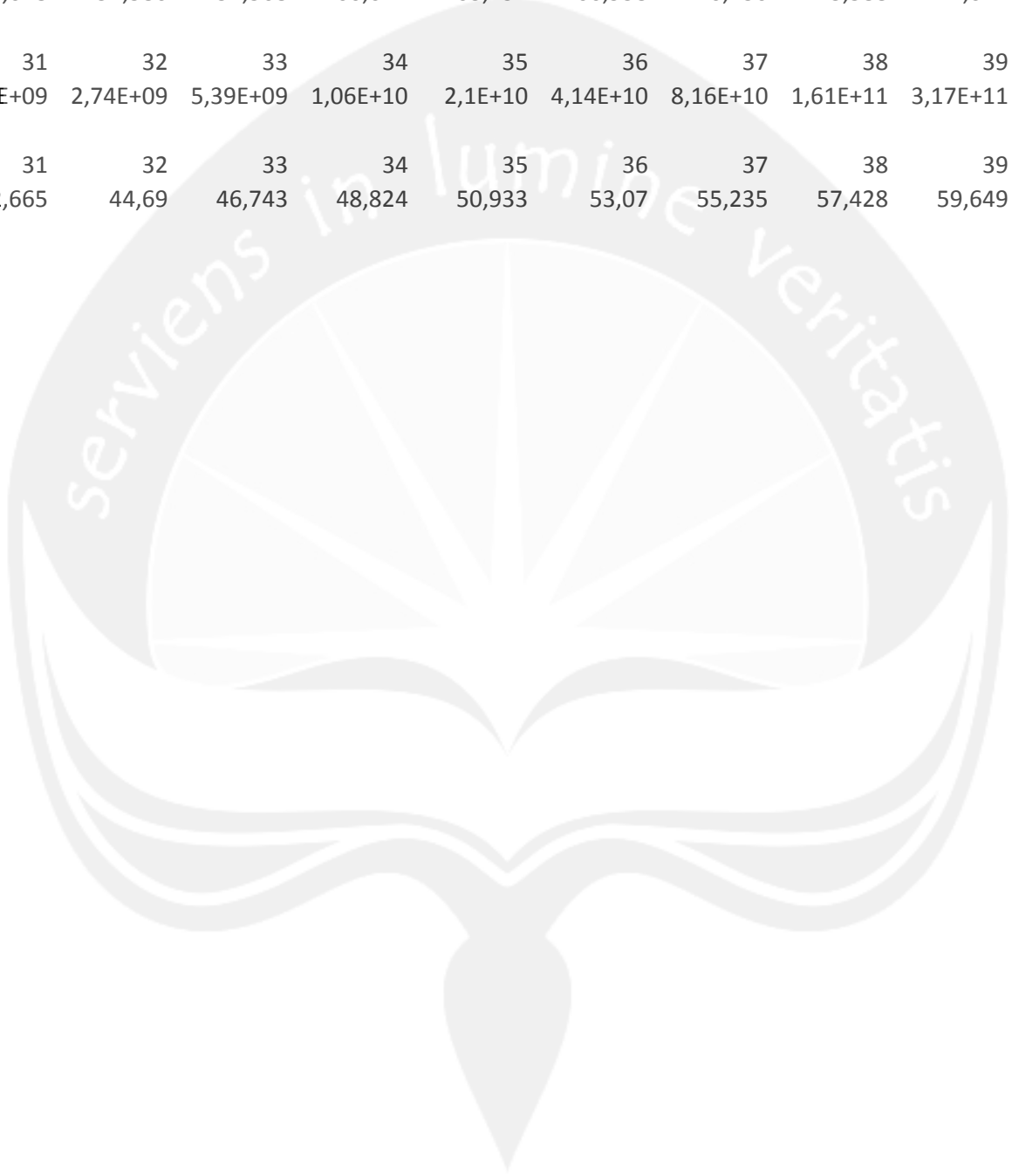


31	32	33	34	35	36	37	38	39
108,3741	112,3484	116,3229	120,2976	124,2725	128,2476	132,2229	136,1984	140,1741

31	32	33	34	35	36	37	38	39
51,678	54,586	57,568	60,624	63,754	66,958	70,236	73,588	77,014

31	32	33	34	35	36	37	38	39
1,39E+09	2,74E+09	5,39E+09	1,06E+10	2,1E+10	4,14E+10	8,16E+10	1,61E+11	3,17E+11

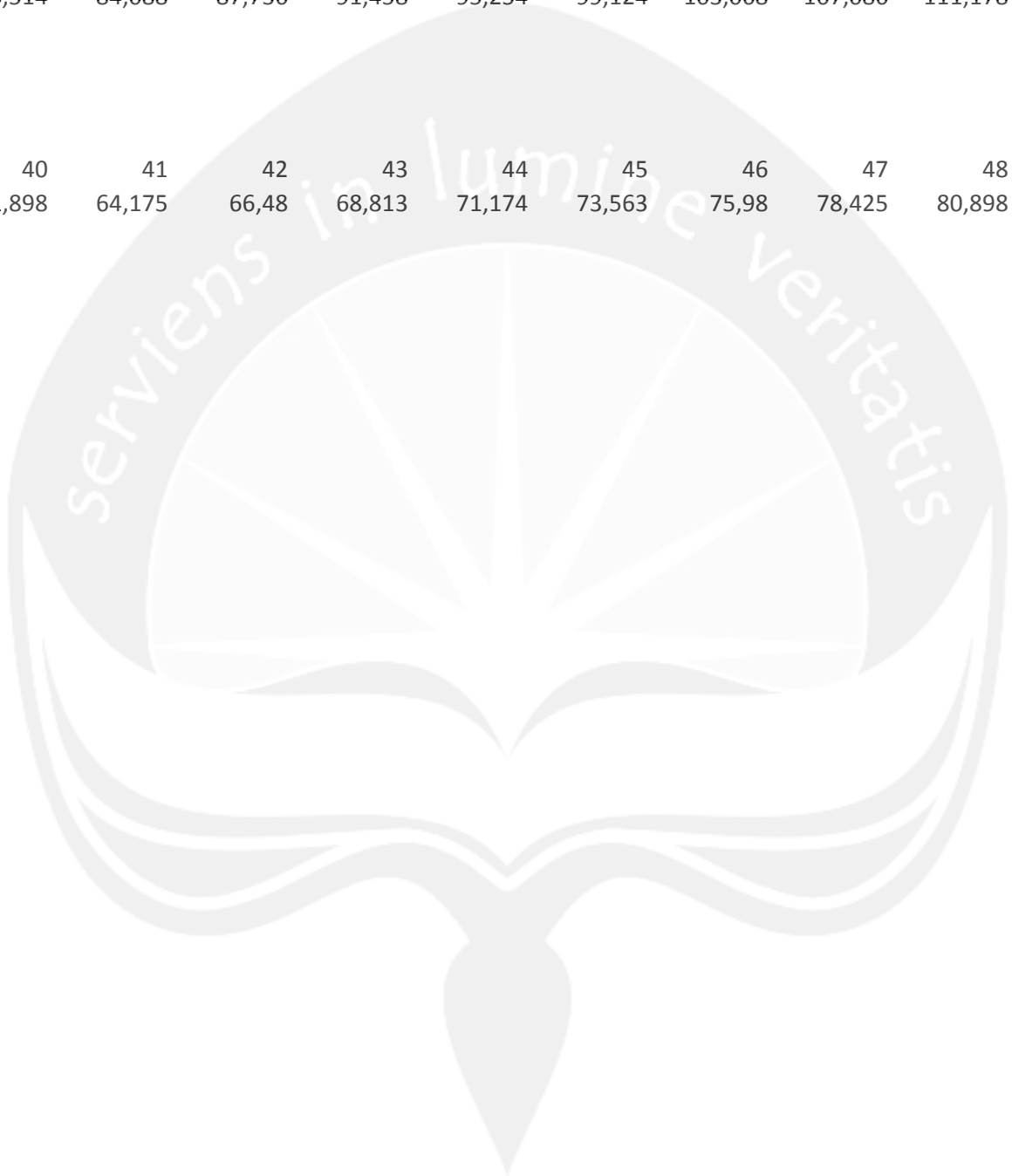
31	32	33	34	35	36	37	38	39
42,665	44,69	46,743	48,824	50,933	53,07	55,235	57,428	59,649



40	41	42	43	44	45	46	47	48
144,15	148,1261	152,1024	156,0789	160,0556	164,0325	168,0096	171,9869	175,9644

40	41	42	43	44	45	46	47	48
80,514	84,088	87,736	91,458	95,254	99,124	103,068	107,086	111,178

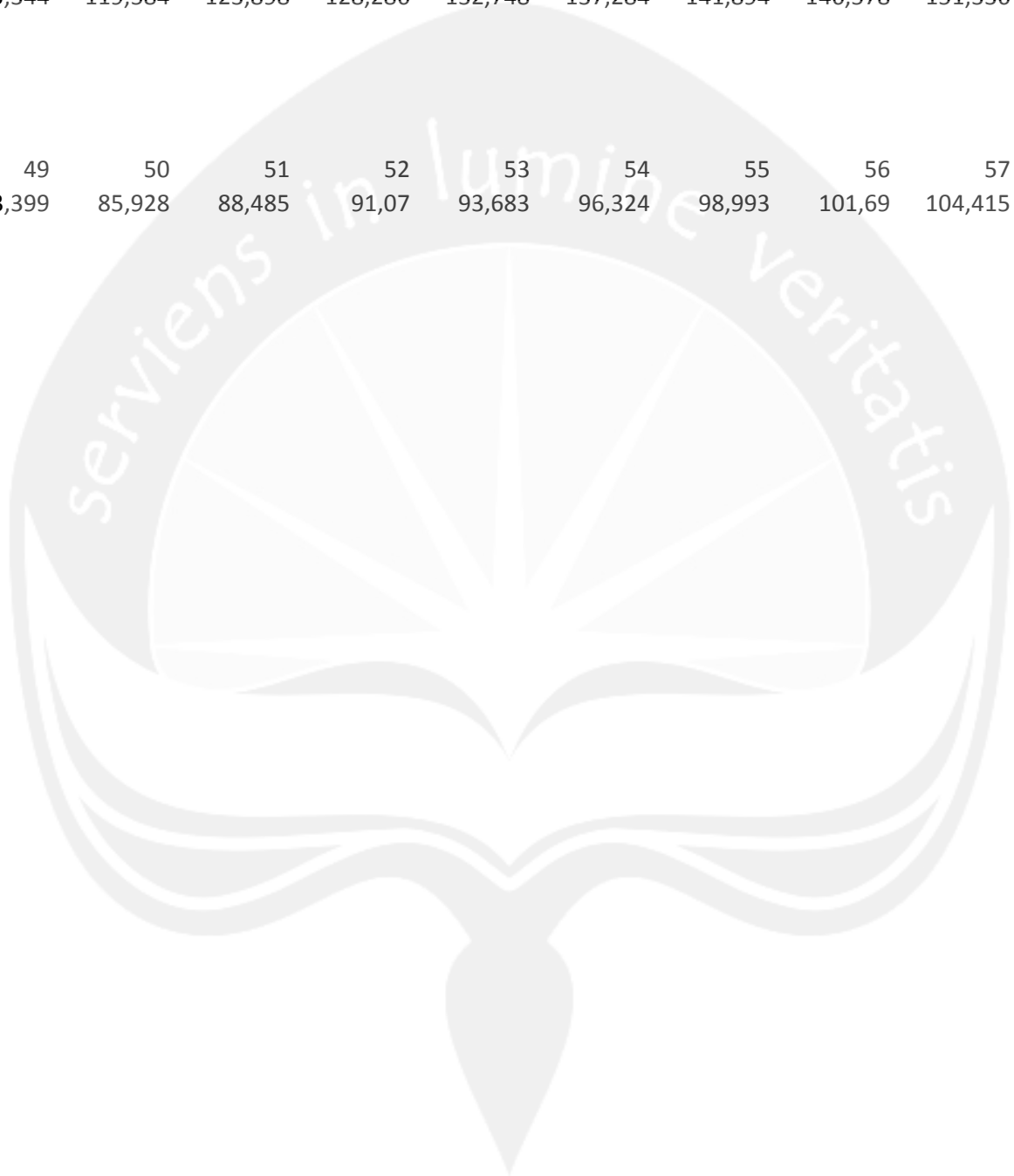
40	41	42	43	44	45	46	47	48
61,898	64,175	66,48	68,813	71,174	73,563	75,98	78,425	80,898



49	50	51	52	53	54	55	56	57
179,9421	183,92	187,8981	191,8764	195,8549	199,8336	203,8125	207,7916	211,7709

49	50	51	52	53	54	55	56	57
115,344	119,584	123,898	128,286	132,748	137,284	141,894	146,578	151,336

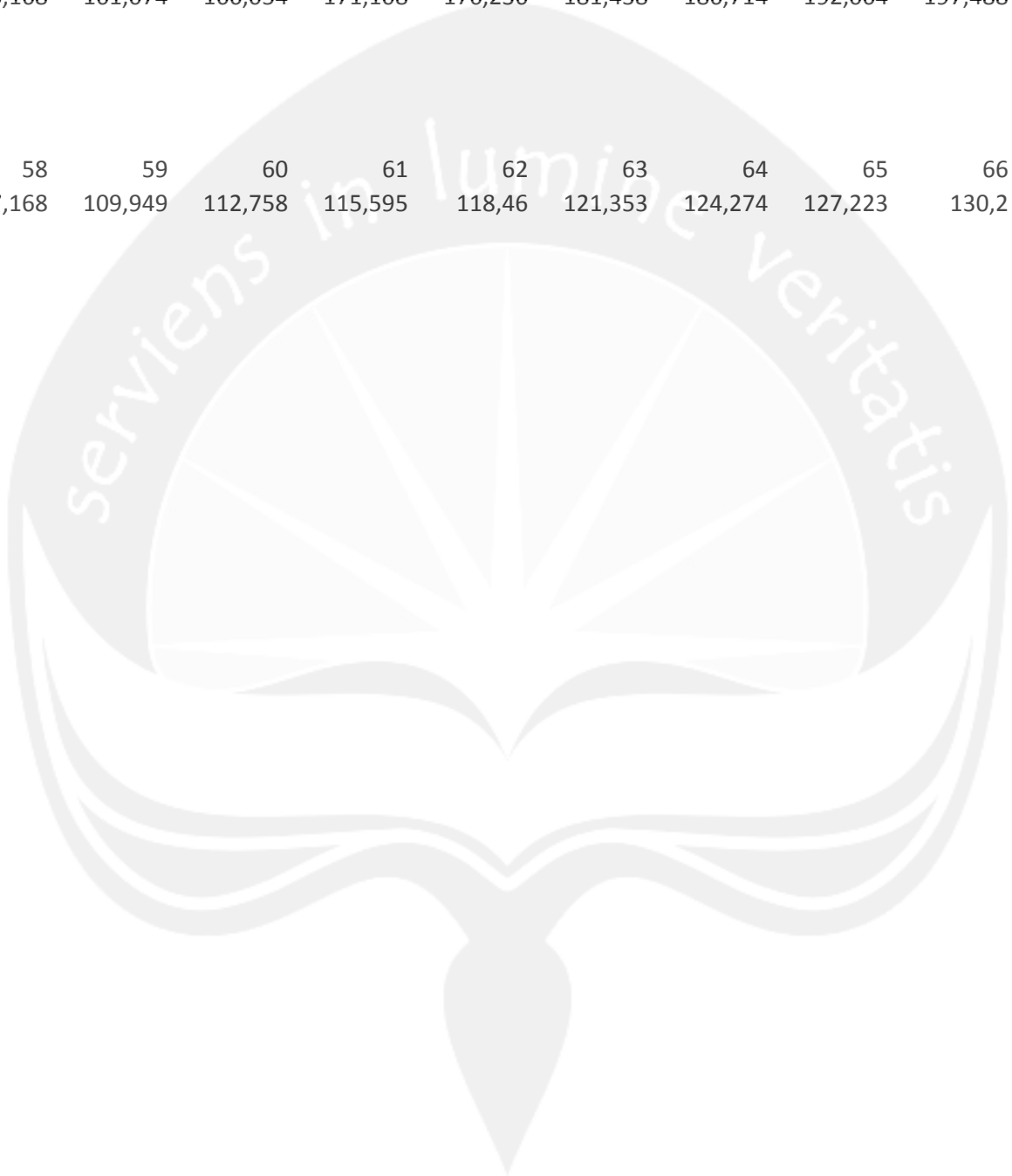
49	50	51	52	53	54	55	56	57
83,399	85,928	88,485	91,07	93,683	96,324	98,993	101,69	104,415



58	59	60	61	62	63	64	65	66
215,7504	219,7301	223,71	227,6901	231,6704	235,6509	239,6316	243,6125	247,5936

58	59	60	61	62	63	64	65	66
156,168	161,074	166,054	171,108	176,236	181,438	186,714	192,064	197,488

58	59	60	61	62	63	64	65	66
107,168	109,949	112,758	115,595	118,46	121,353	124,274	127,223	130,2

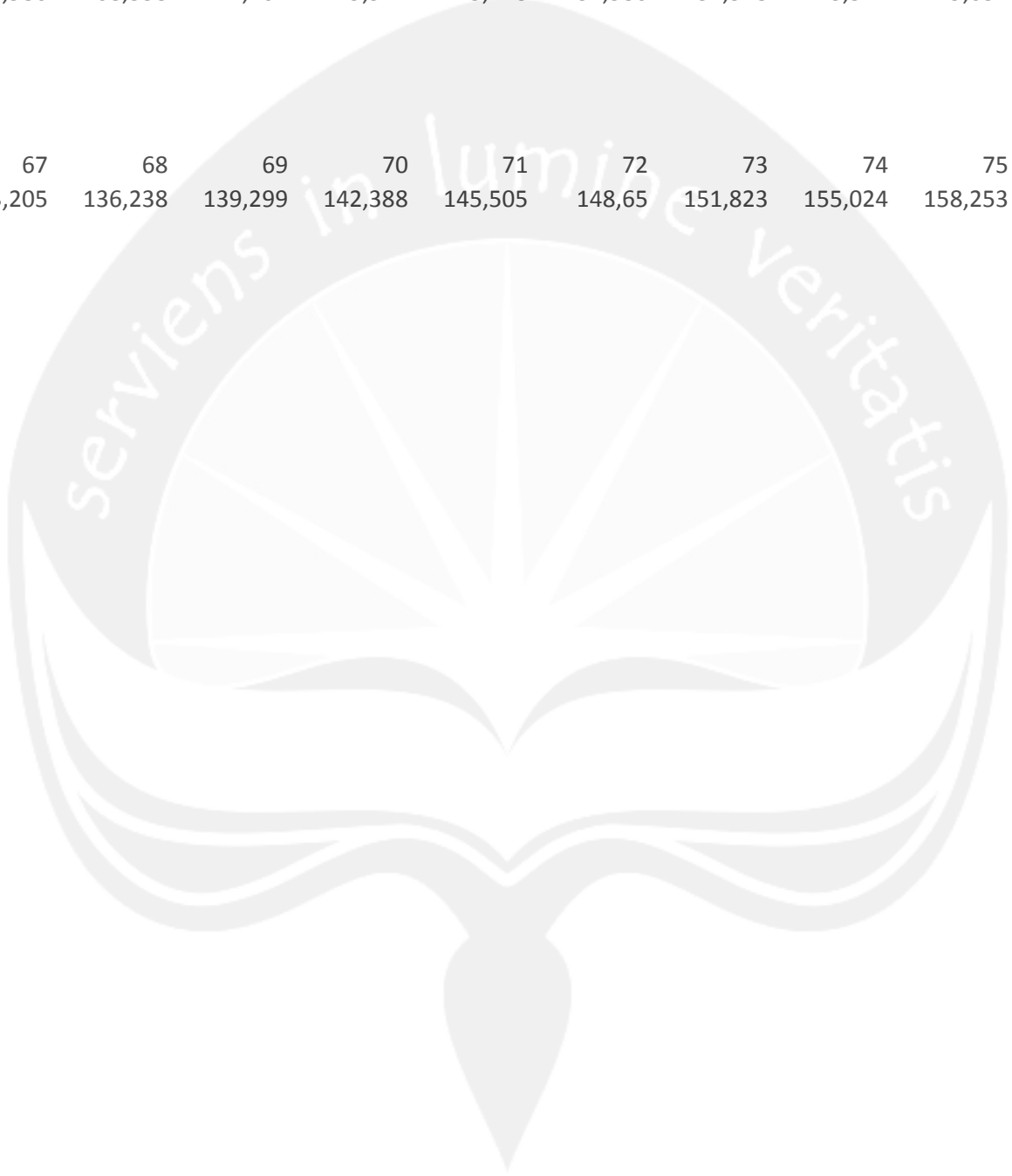




67	68	69	70	71	72	73	74	75
251,5749	255,5564	259,5381	263,52	267,5021	271,4844	275,4669	279,4496	283,4325

67	68	69	70	71	72	73	74	75
202,986	208,558	214,204	219,924	225,718	231,586	237,528	243,544	249,634

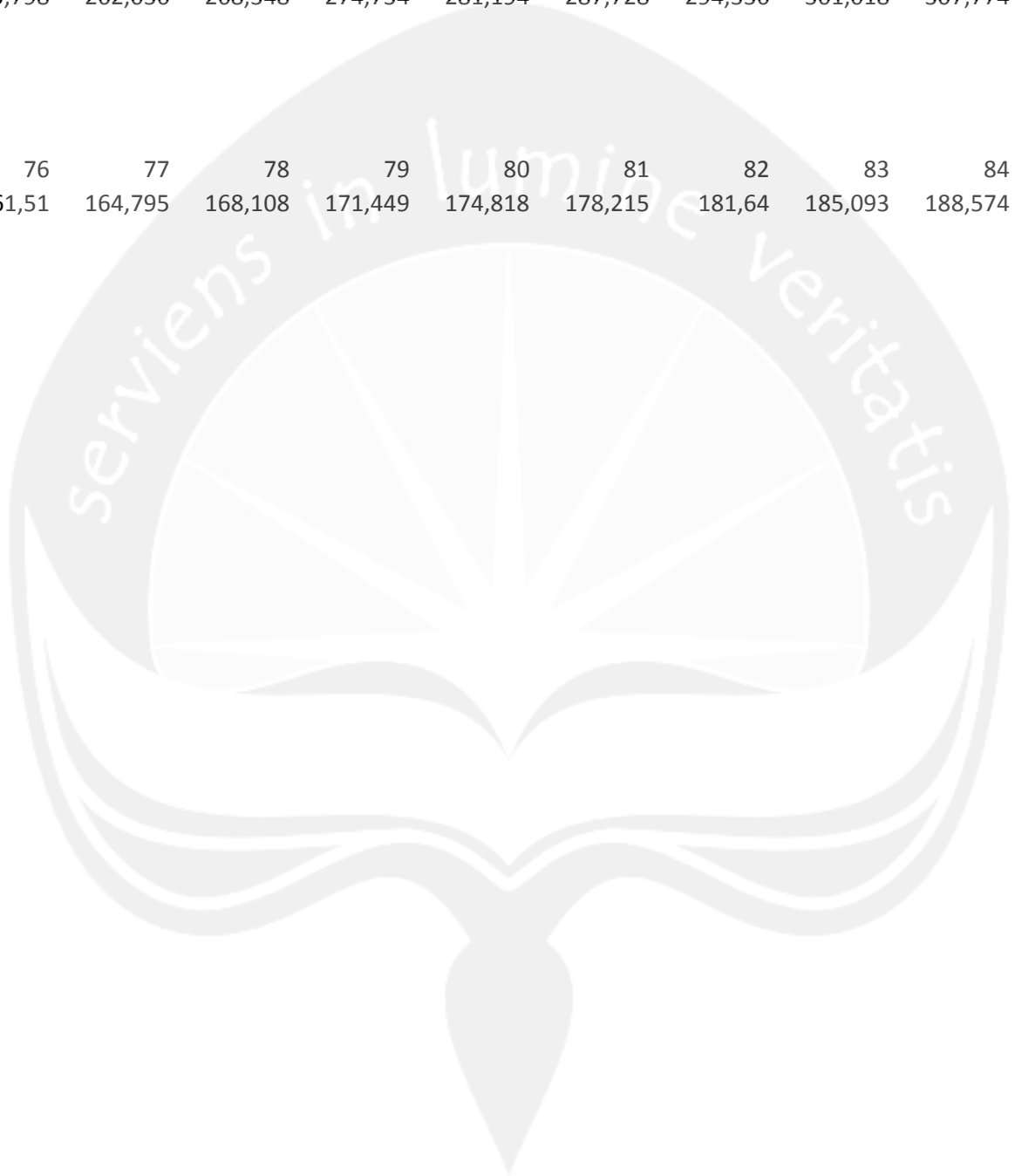
67	68	69	70	71	72	73	74	75
133,205	136,238	139,299	142,388	145,505	148,65	151,823	155,024	158,253



76	77	78	79	80	81	82	83	84
287,4156	291,3989	295,3824	299,3661	303,35	307,3341	311,3184	315,3029	319,2876

76	77	78	79	80	81	82	83	84
255,798	262,036	268,348	274,734	281,194	287,728	294,336	301,018	307,774

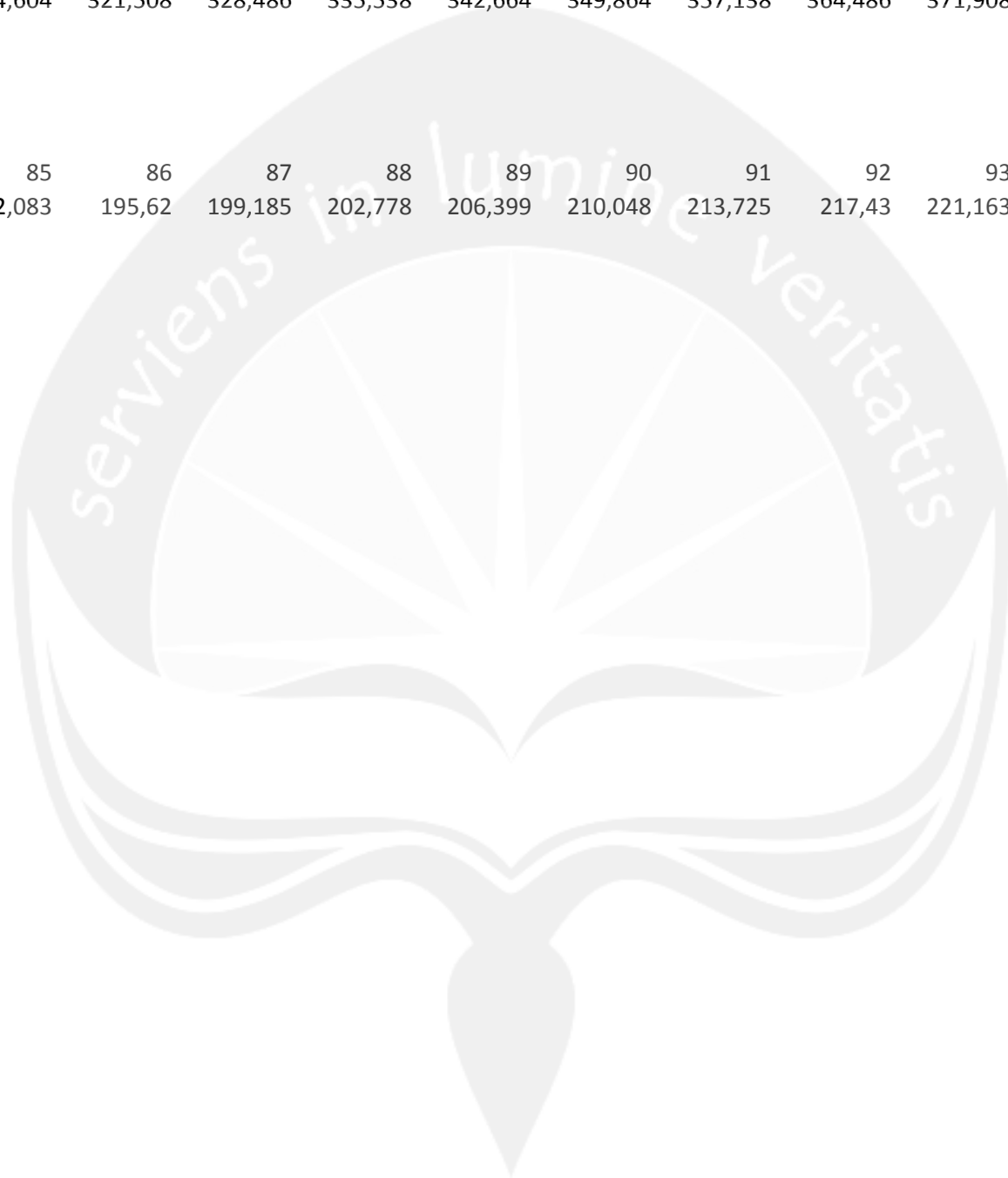
76	77	78	79	80	81	82	83	84
161,51	164,795	168,108	171,449	174,818	178,215	181,64	185,093	188,574



85	86	87	88	89	90	91	92	93
323,2725	327,2576	331,2429	335,2284	339,2141	343,2	347,1861	351,1724	355,1589

85	86	87	88	89	90	91	92	93
314,604	321,508	328,486	335,538	342,664	349,864	357,138	364,486	371,908

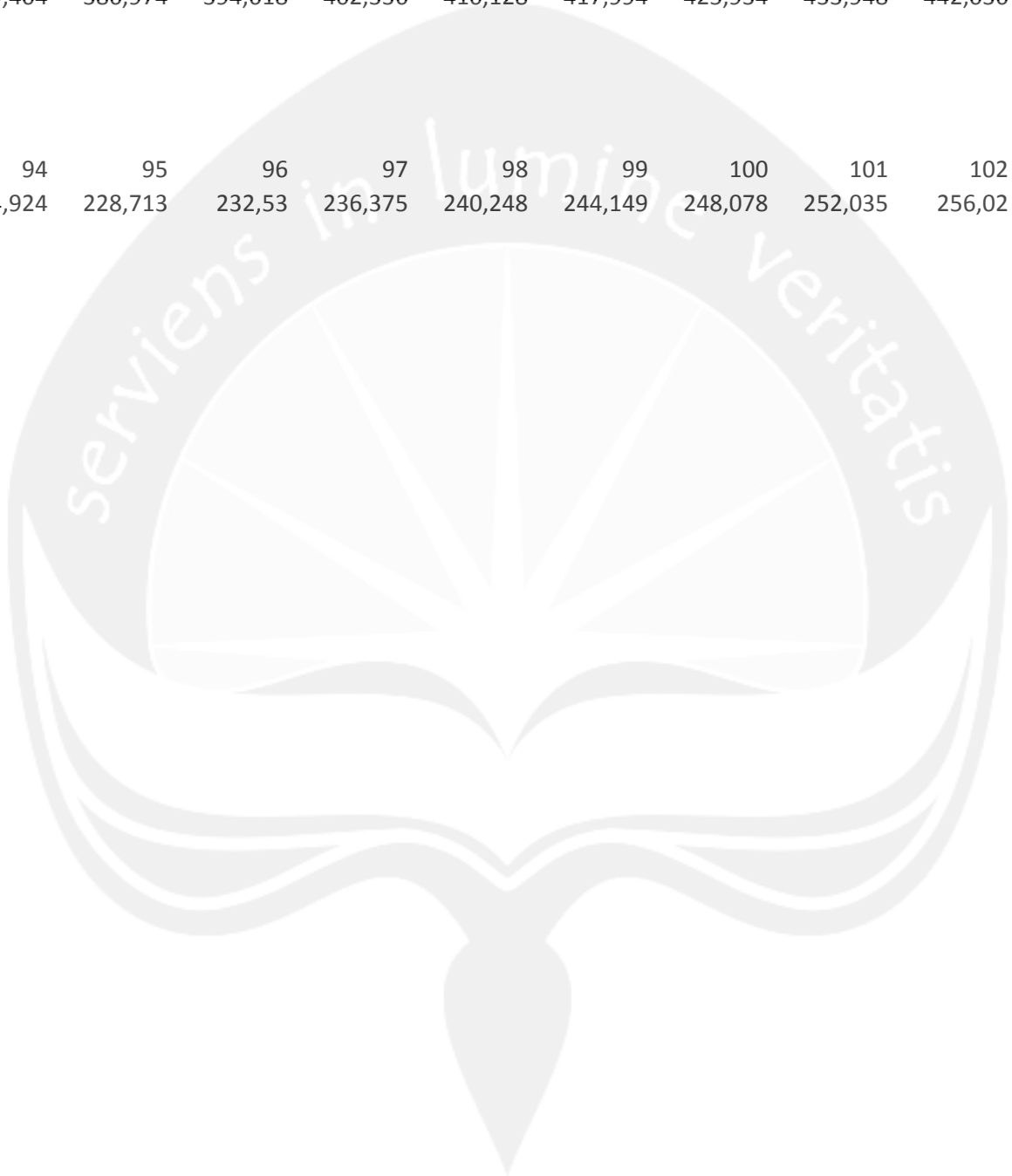
85	86	87	88	89	90	91	92	93
192,083	195,62	199,185	202,778	206,399	210,048	213,725	217,43	221,163



94	95	96	97	98	99	100	101	102
359,1456	363,1325	367,1196	371,1069	375,0944	379,0821	383,07	387,0581	391,0464

94	95	96	97	98	99	100	101	102
379,404	386,974	394,618	402,336	410,128	417,994	425,934	433,948	442,036

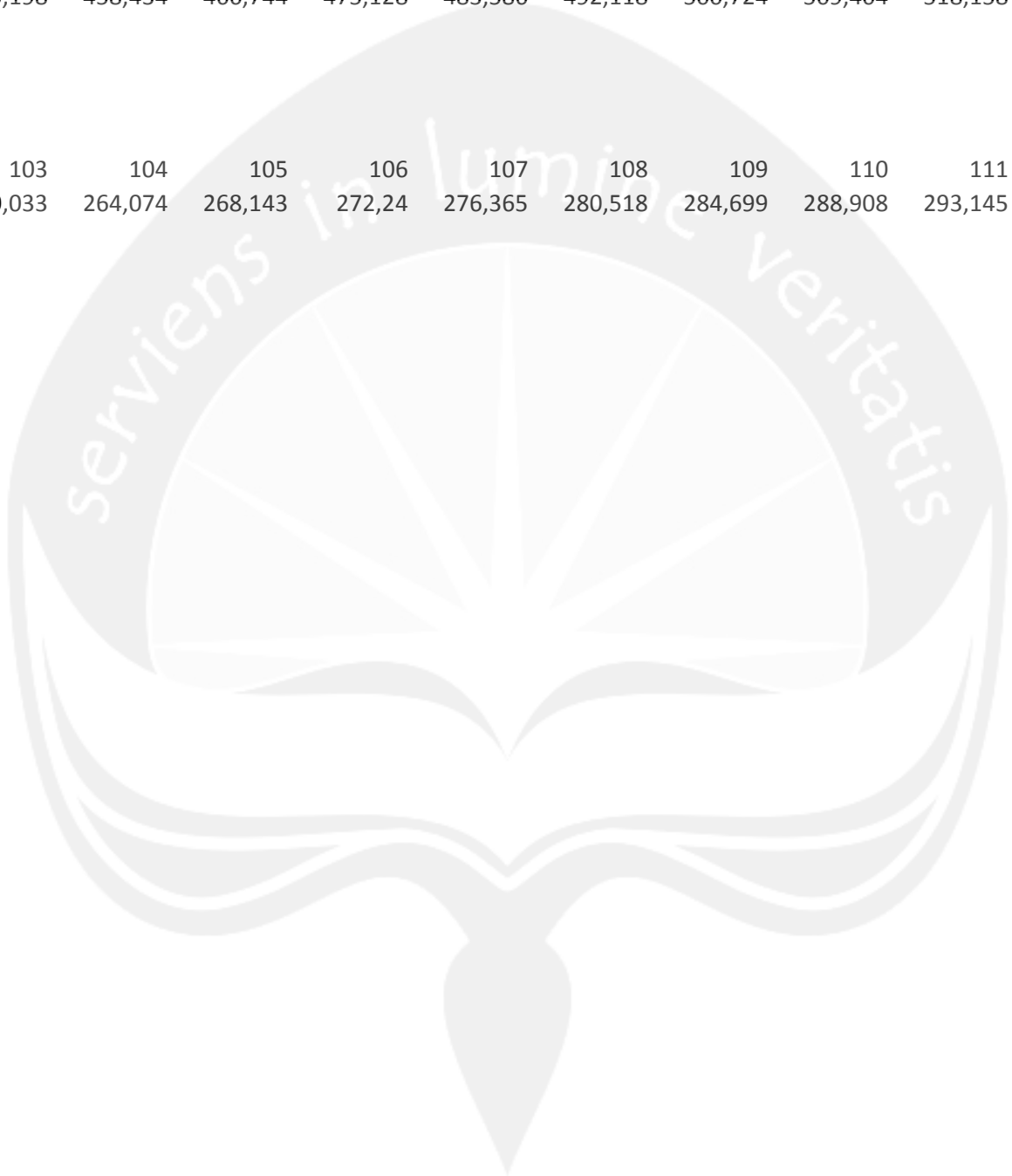
94	95	96	97	98	99	100	101	102
224,924	228,713	232,53	236,375	240,248	244,149	248,078	252,035	256,02



103	104	105	106	107	108	109	110	111
395,0349	399,0236	403,0125	407,0016	410,9909	414,9804	418,9701	422,96	426,9501

103	104	105	106	107	108	109	110	111
450,198	458,434	466,744	475,128	483,586	492,118	500,724	509,404	518,158

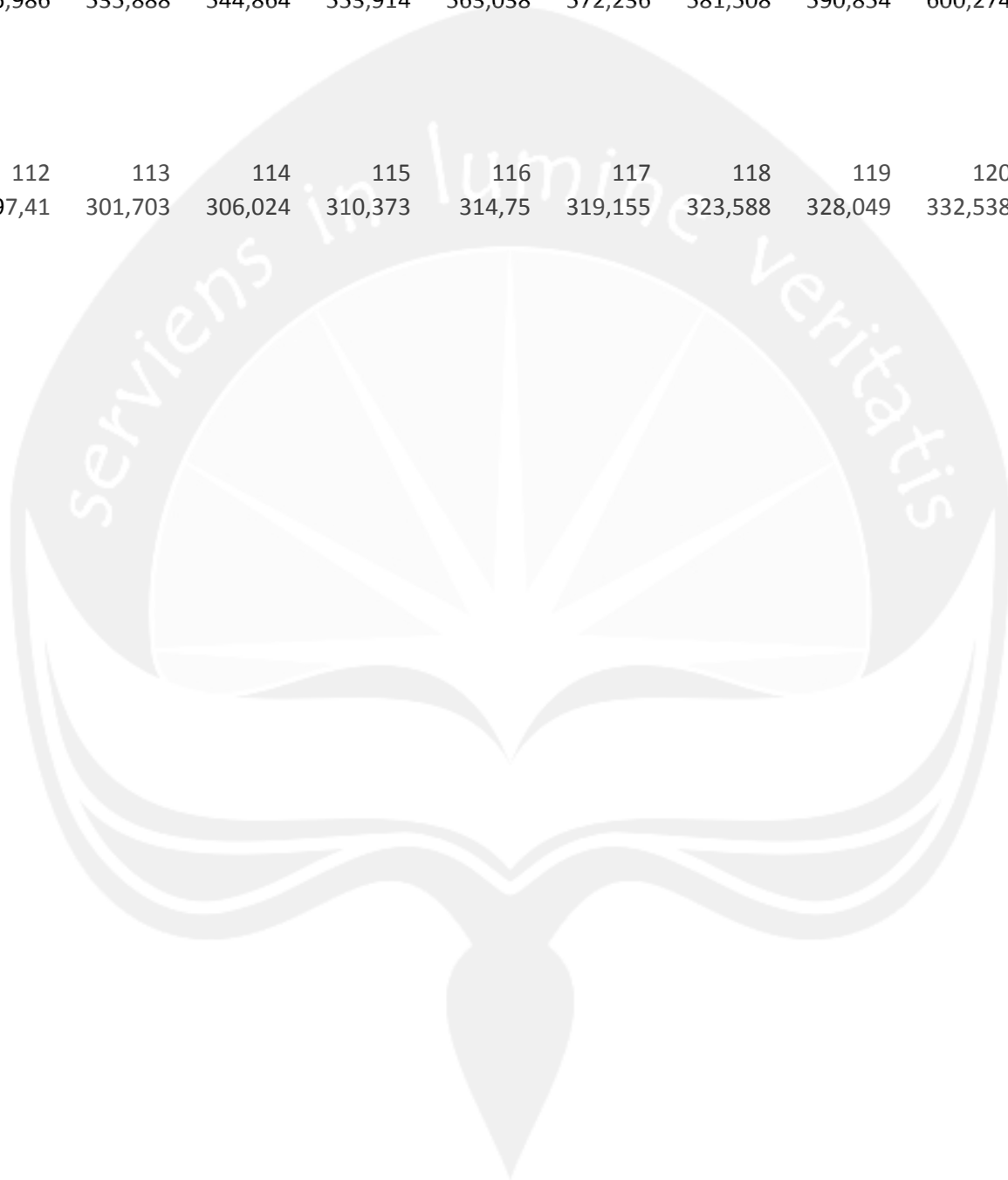
103	104	105	106	107	108	109	110	111
260,033	264,074	268,143	272,24	276,365	280,518	284,699	288,908	293,145



112	113	114	115	116	117	118	119	120
430,9404	434,9309	438,9216	442,9125	446,9036	450,8949	454,8864	458,8781	462,87

112	113	114	115	116	117	118	119	120
526,986	535,888	544,864	553,914	563,038	572,236	581,508	590,854	600,274

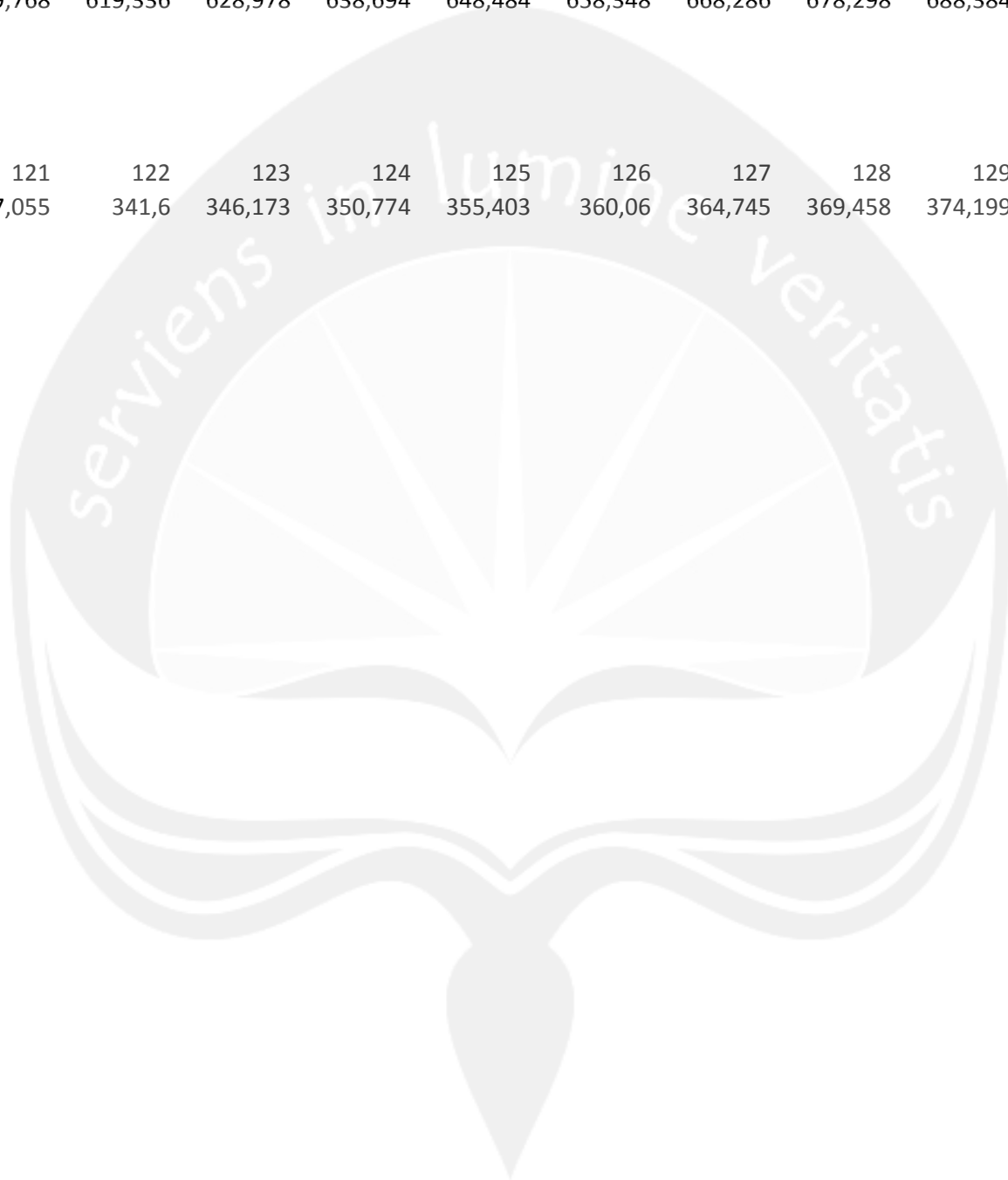
112	113	114	115	116	117	118	119	120
297,41	301,703	306,024	310,373	314,75	319,155	323,588	328,049	332,538



121	122	123	124	125	126	127	128	129
466,8621	470,8544	474,8469	478,8396	482,8325	486,8256	490,8189	494,8124	498,8061

121	122	123	124	125	126	127	128	129
609,768	619,336	628,978	638,694	648,484	658,348	668,286	678,298	688,384

121	122	123	124	125	126	127	128	129
337,055	341,6	346,173	350,774	355,403	360,06	364,745	369,458	374,199



130	131	132	133	134	135	136	137	138
502,8	506,7941	510,7884	514,7829	518,7776	522,7725	526,7676	530,7629	534,7584

130	131	132	133	134	135	136	137	138
698,544	708,778	719,086	729,468	739,924	750,454	761,058	771,736	782,488

130	131	132	133	134	135	136	137	138
378,968	383,765	388,59	393,443	398,324	403,233	408,17	413,135	418,128

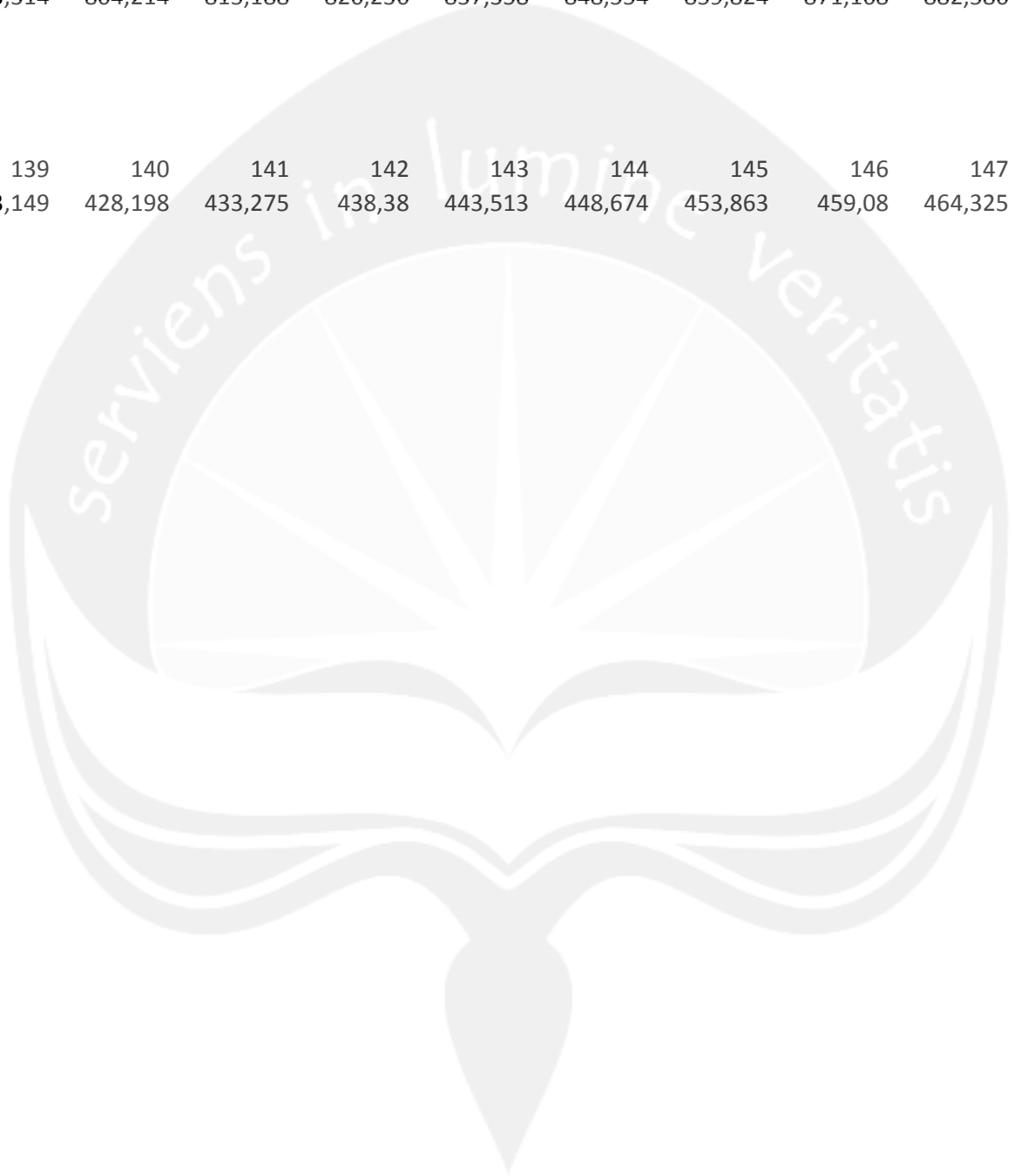




139	140	141	142	143	144	145	146	147
538,7541	542,75	546,7461	550,7424	554,7389	558,7356	562,7325	566,7296	570,7269

139	140	141	142	143	144	145	146	147
793,314	804,214	815,188	826,236	837,358	848,554	859,824	871,168	882,586

139	140	141	142	143	144	145	146	147
423,149	428,198	433,275	438,38	443,513	448,674	453,863	459,08	464,325



148	149	150	151	152	153	154	155	156
574,7244	578,7221	582,72	586,7181	590,7164	594,7149	598,7136	602,7125	606,7116

148	149	150	151	152	153	154	155	156
894,078	905,644	917,284	928,998	940,786	952,648	964,584	976,594	988,678

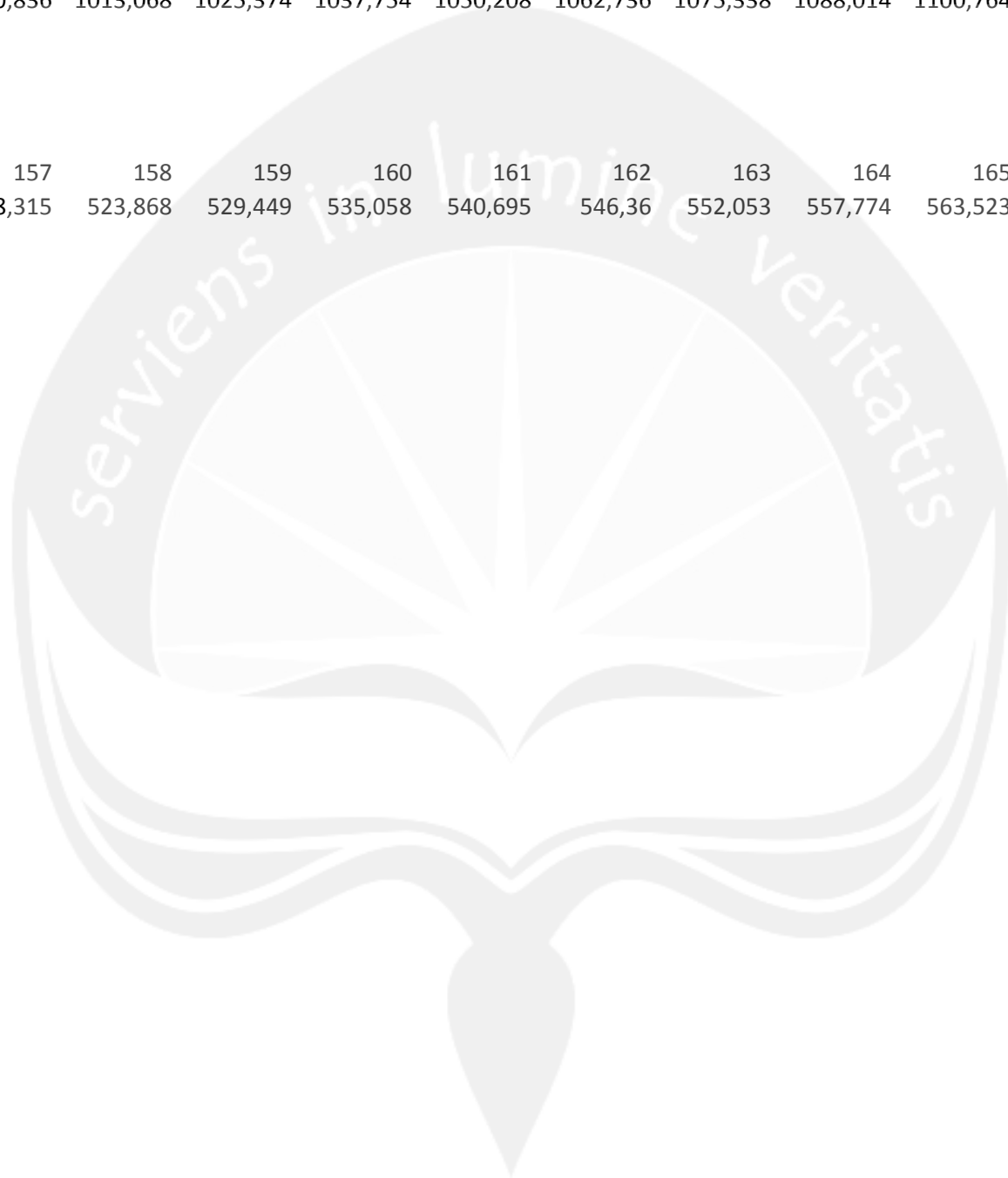
148	149	150	151	152	153	154	155	156
469,598	474,899	480,228	485,585	490,97	496,383	501,824	507,293	512,79



157	158	159	160	161	162	163	164	165
610,7109	614,7104	618,7101	622,71	626,7101	630,7104	634,7109	638,7116	642,7125

157	158	159	160	161	162	163	164	165
1000,836	1013,068	1025,374	1037,754	1050,208	1062,736	1075,338	1088,014	1100,764

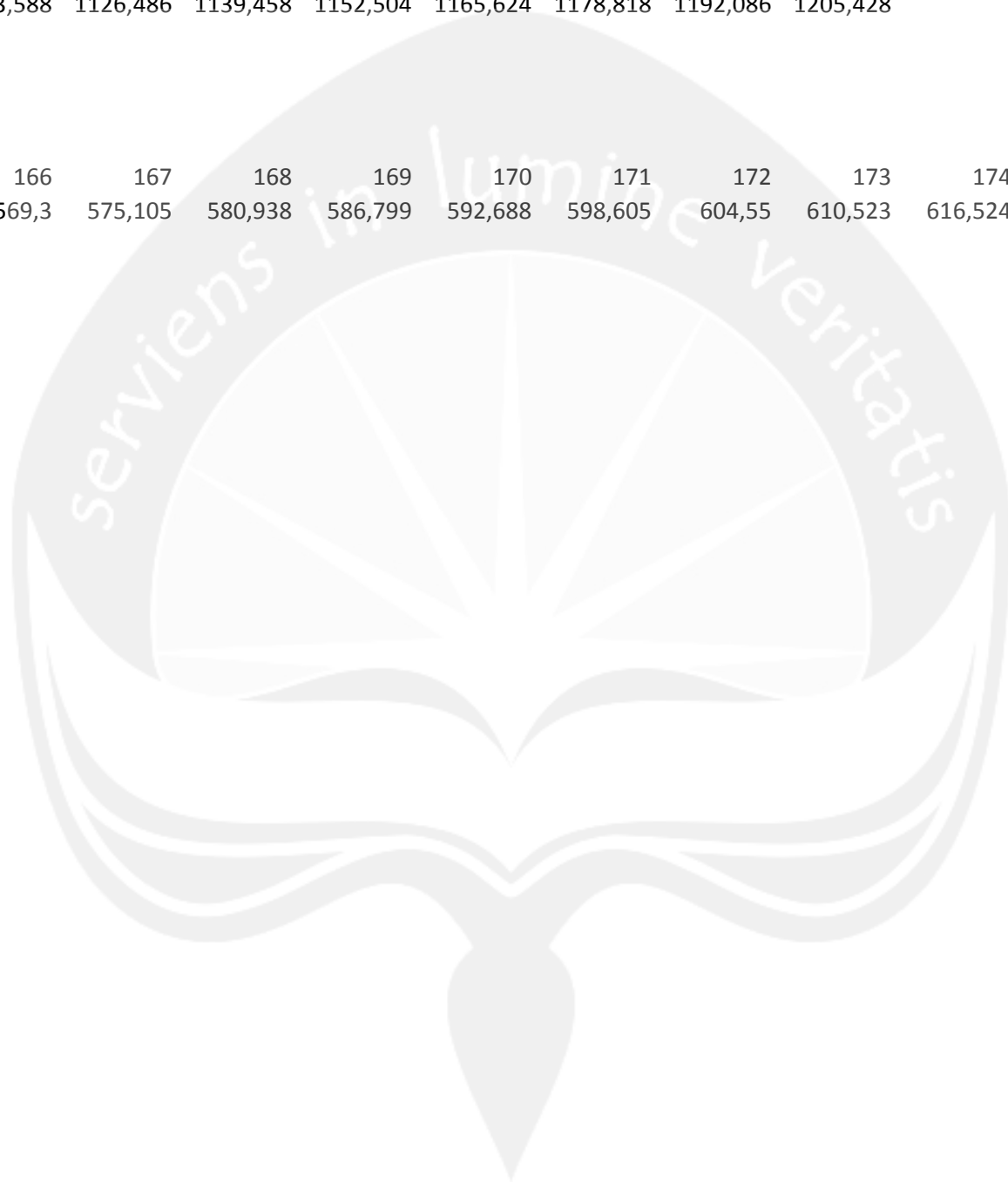
157	158	159	160	161	162	163	164	165
518,315	523,868	529,449	535,058	540,695	546,36	552,053	557,774	563,523



166	167	168	169	170	171	172	173	174
646,7136	650,7149	654,7164	658,7181	662,72	666,7221	670,7244	674,7269	678,7296

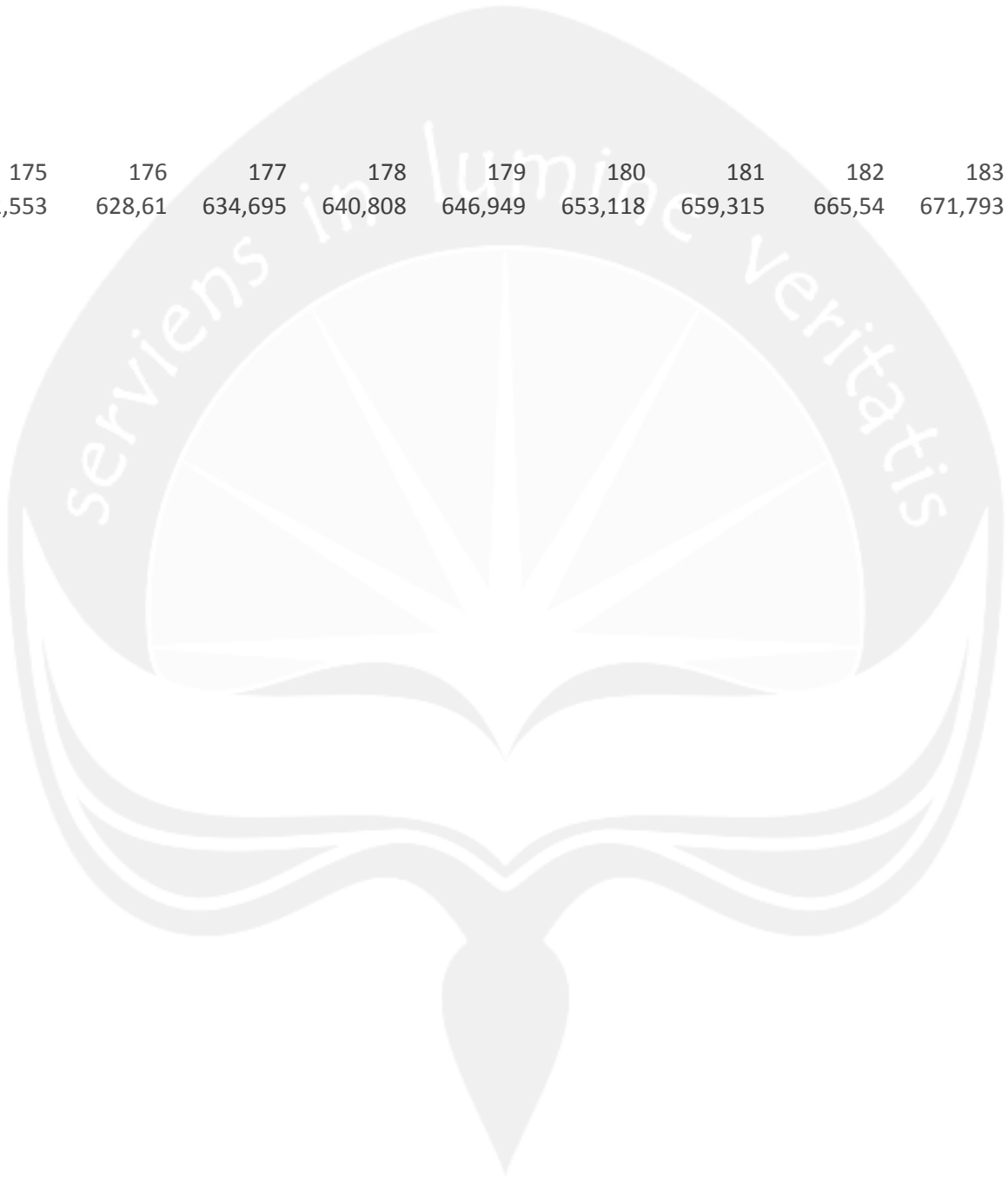
166	167	168	169	170	171	172	173
1113,588	1126,486	1139,458	1152,504	1165,624	1178,818	1192,086	1205,428

166	167	168	169	170	171	172	173	174
569,3	575,105	580,938	586,799	592,688	598,605	604,55	610,523	616,524



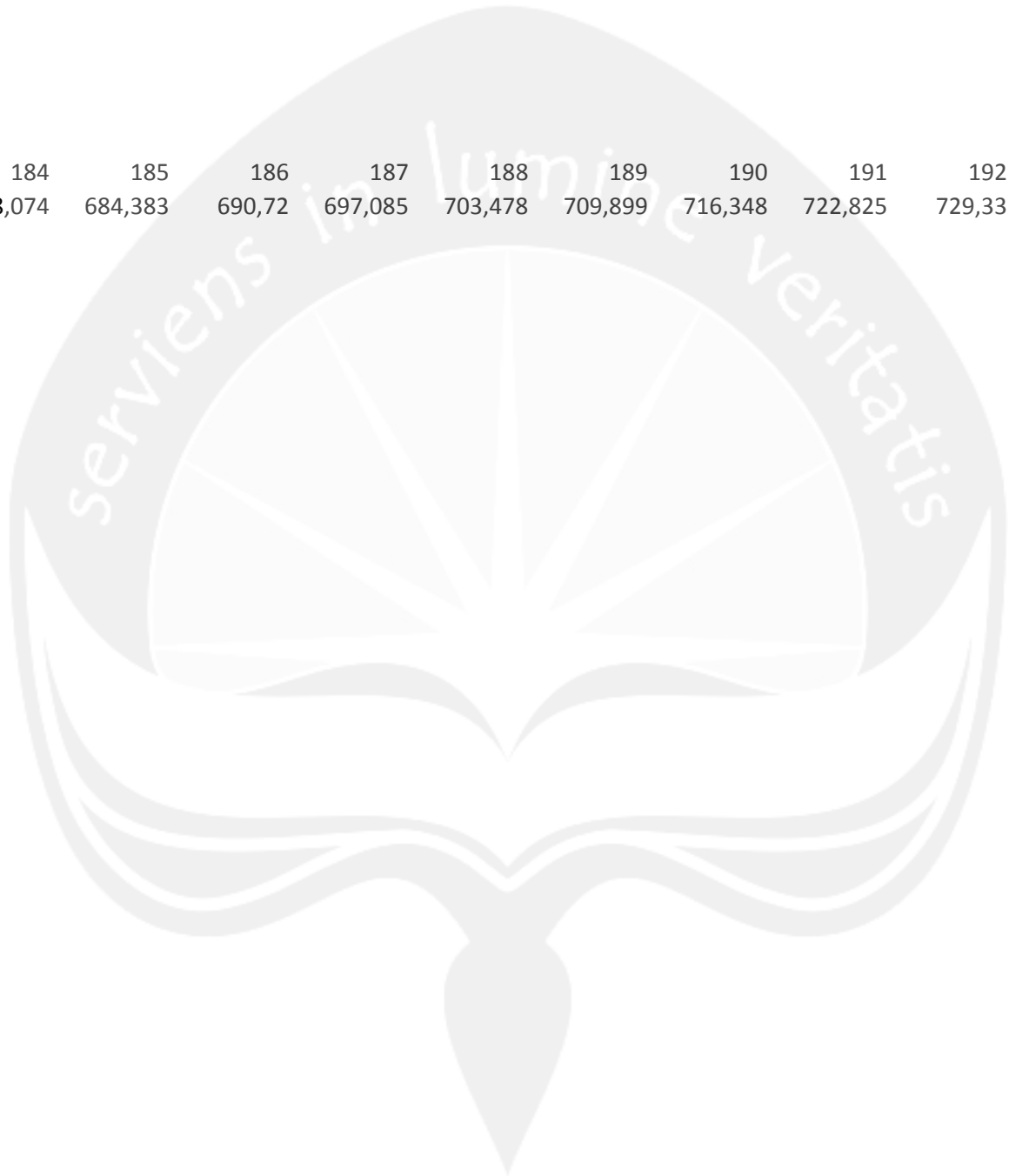
175	176	177	178	179	180	181	182	183
682,7325	686,7356	690,7389	694,7424	698,7461	702,75	706,7541	710,7584	714,7629

175	176	177	178	179	180	181	182	183
622,553	628,61	634,695	640,808	646,949	653,118	659,315	665,54	671,793



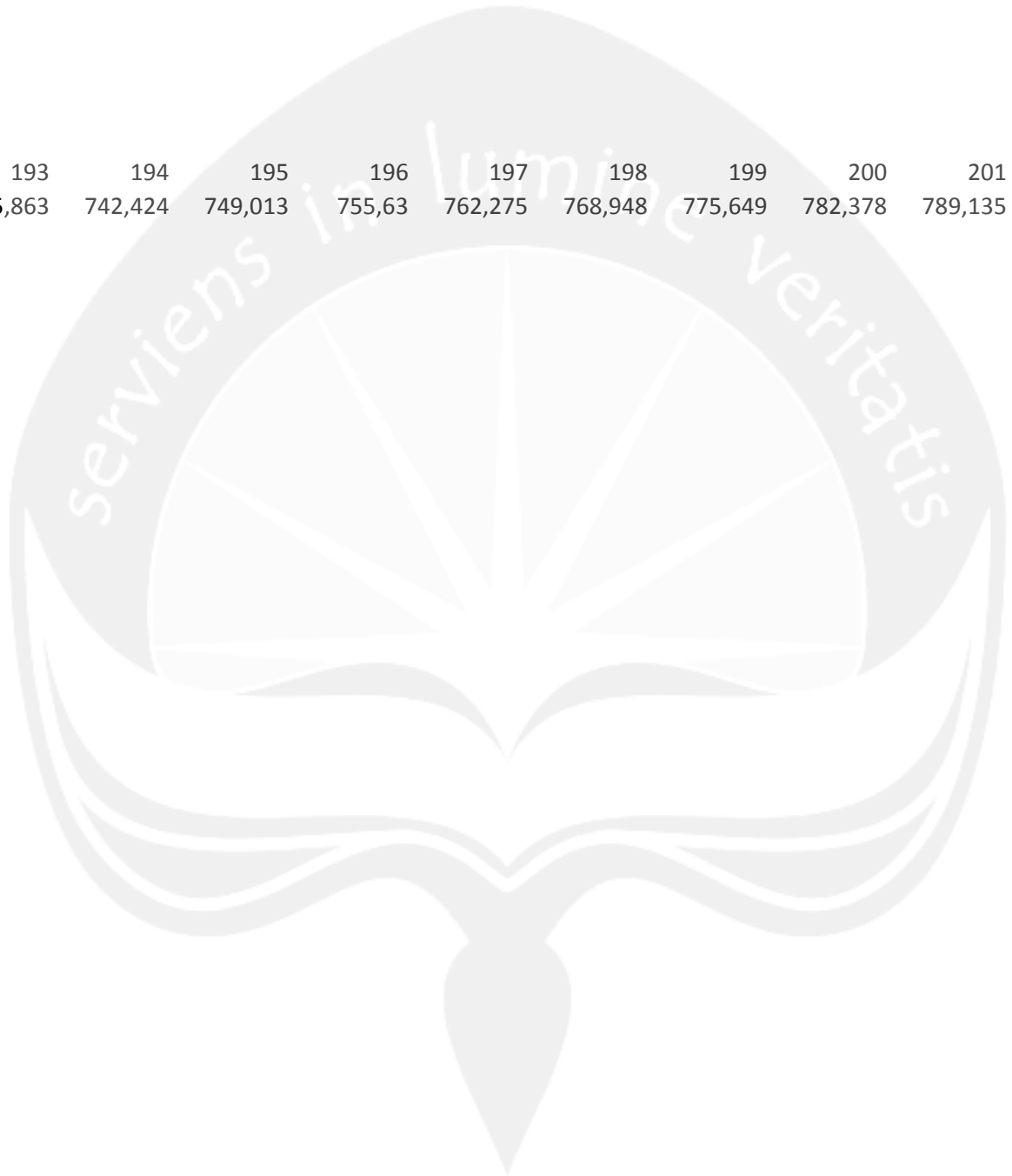
184	185	186	187	188	189	190	191	192
718,7676	722,7725	726,7776	730,7829	734,7884	738,7941	742,8	746,8061	750,8124

184	185	186	187	188	189	190	191	192
678,074	684,383	690,72	697,085	703,478	709,899	716,348	722,825	729,33



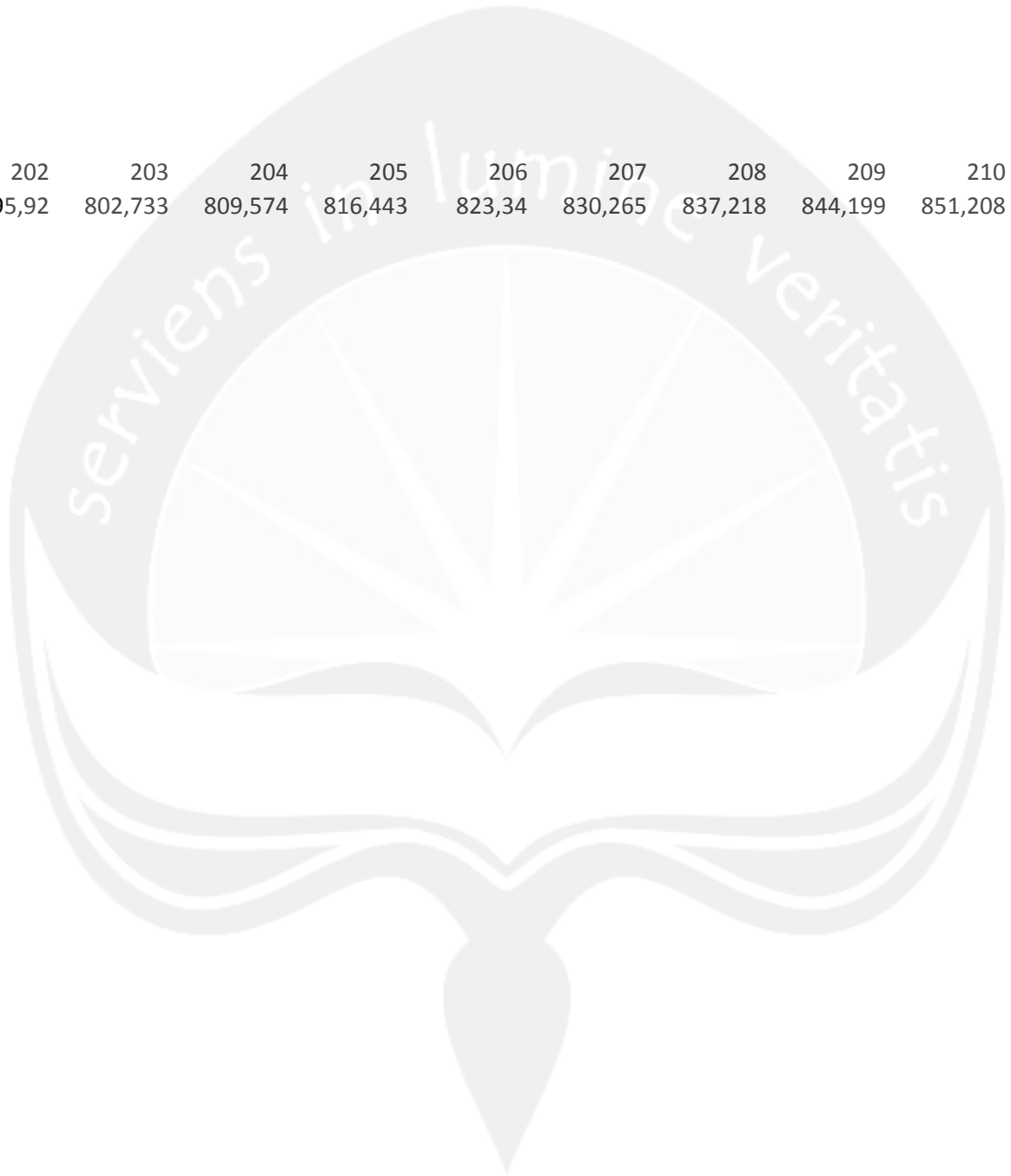
193	194	195	196	197	198	199	200	201
754,8189	758,8256	762,8325	766,8396	770,8469	774,8544	778,8621	782,87	786,8781

193	194	195	196	197	198	199	200	201
735,863	742,424	749,013	755,63	762,275	768,948	775,649	782,378	789,135



202	203	204	205	206	207	208	209	210
790,8864	794,8949	798,9036	802,9125	806,9216	810,9309	814,9404	818,9501	822,96

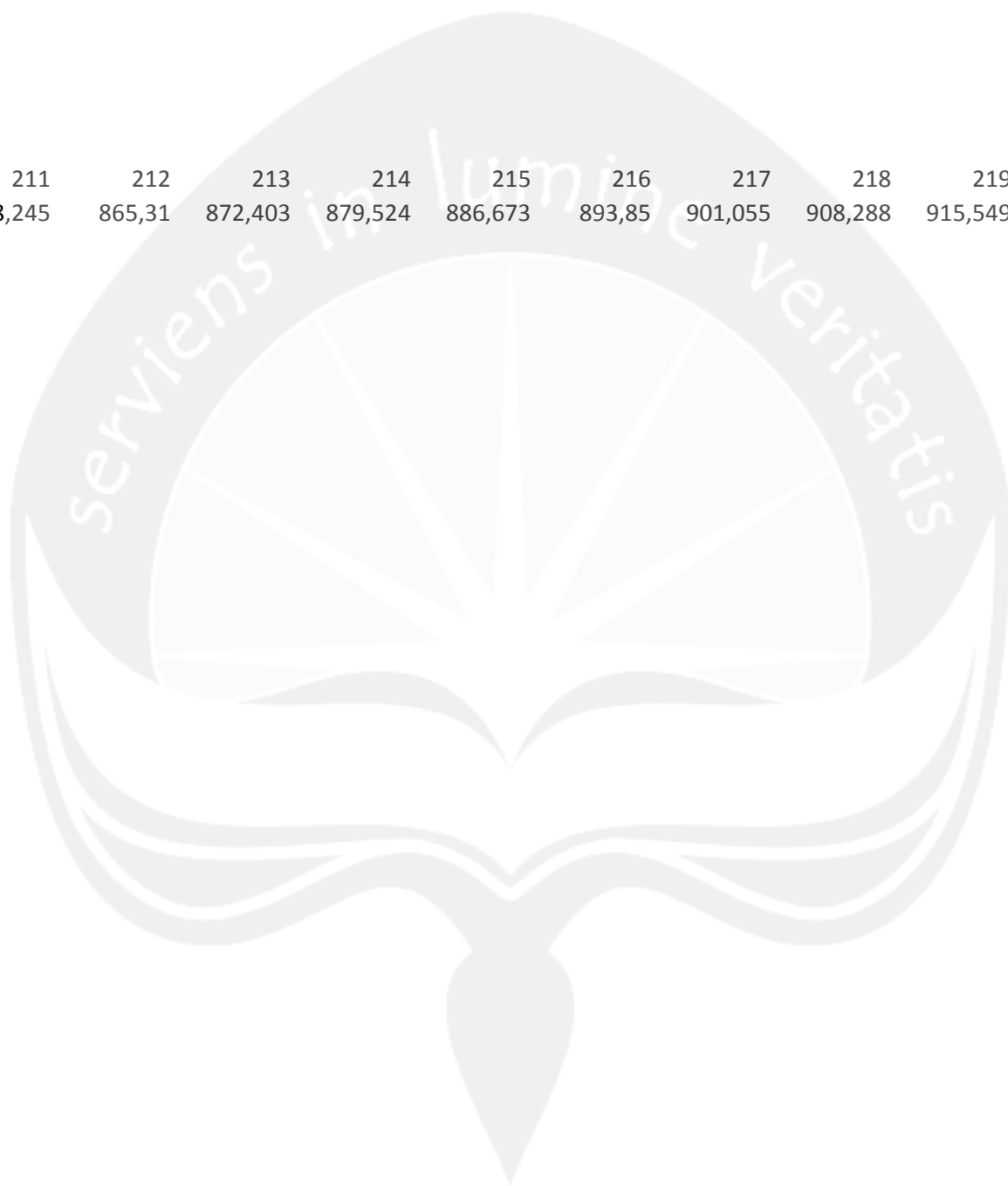
202	203	204	205	206	207	208	209	210
795,92	802,733	809,574	816,443	823,34	830,265	837,218	844,199	851,208





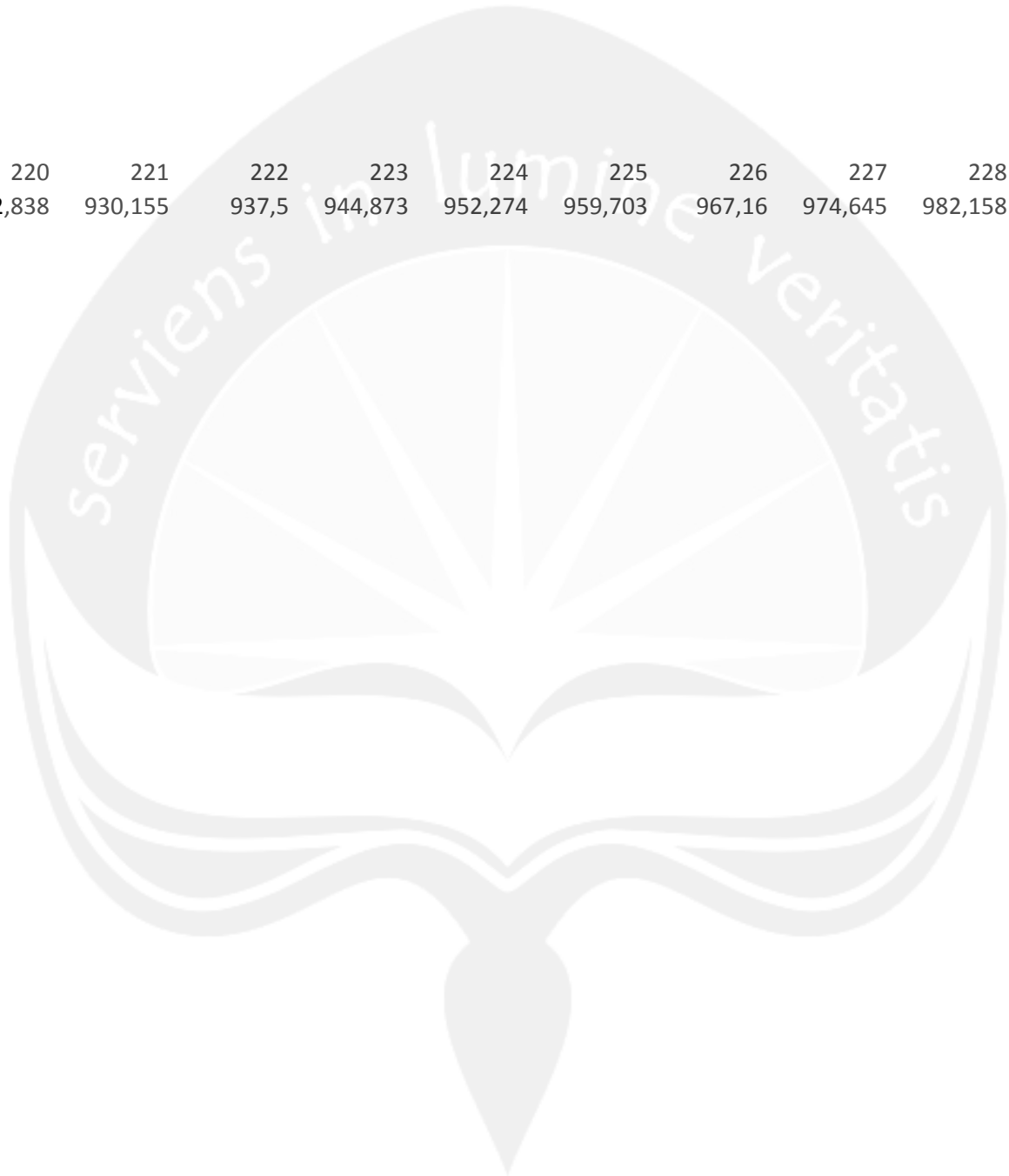
211	212	213	214	215	216	217	218	219
826,9701	830,9804	834,9909	839,0016	843,0125	847,0236	851,0349	855,0464	859,0581

211	212	213	214	215	216	217	218	219
858,245	865,31	872,403	879,524	886,673	893,85	901,055	908,288	915,549



220	221	222	223	224	225	226	227	228
863,07	867,0821	871,0944	875,1069	879,1196	883,1325	887,1456	891,1589	895,1724

220	221	222	223	224	225	226	227	228
922,838	930,155	937,5	944,873	952,274	959,703	967,16	974,645	982,158



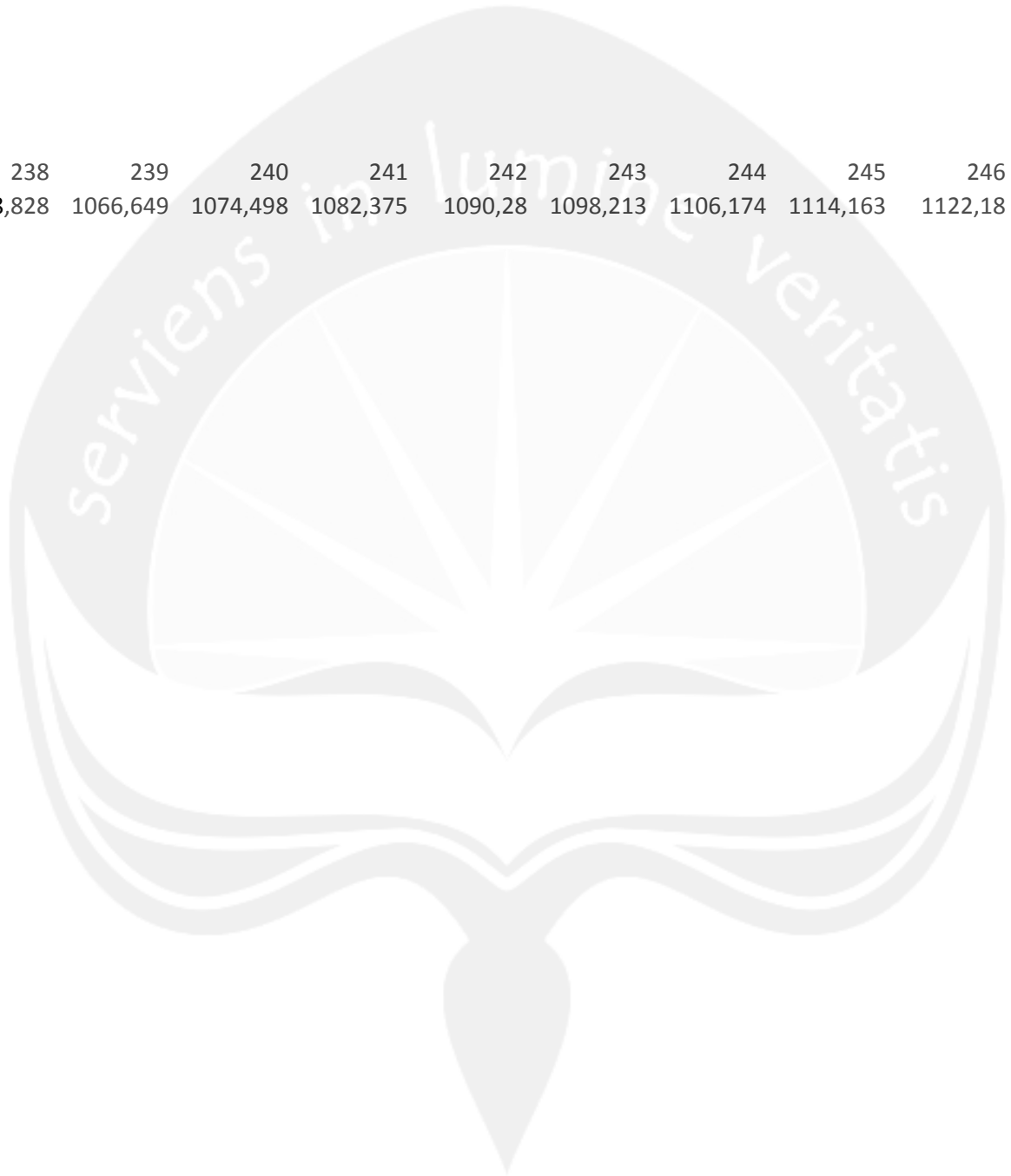
229	230	231	232	233	234	235	236	237
899,1861	903,2	907,2141	911,2284	915,2429	919,2576	923,2725	927,2876	931,3029

229	230	231	232	233	234	235	236	237
989,699	997,268	1004,865	1012,49	1020,143	1027,824	1035,533	1043,27	1051,035



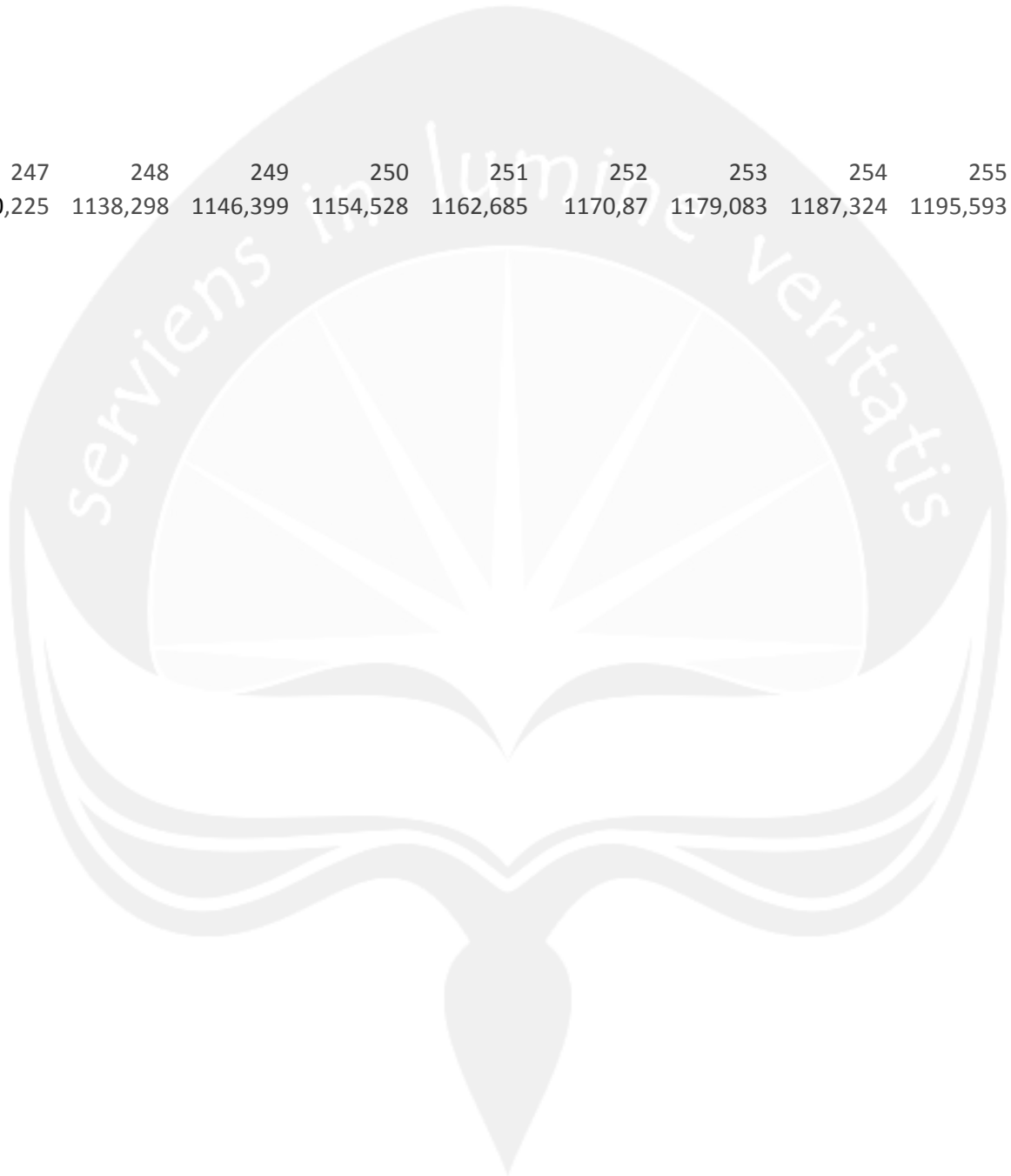
238	239	240	241	242	243	244	245	246
935,3184	939,3341	943,35	947,3661	951,3824	955,3989	959,4156	963,4325	967,4496

238	239	240	241	242	243	244	245	246
1058,828	1066,649	1074,498	1082,375	1090,28	1098,213	1106,174	1114,163	1122,18



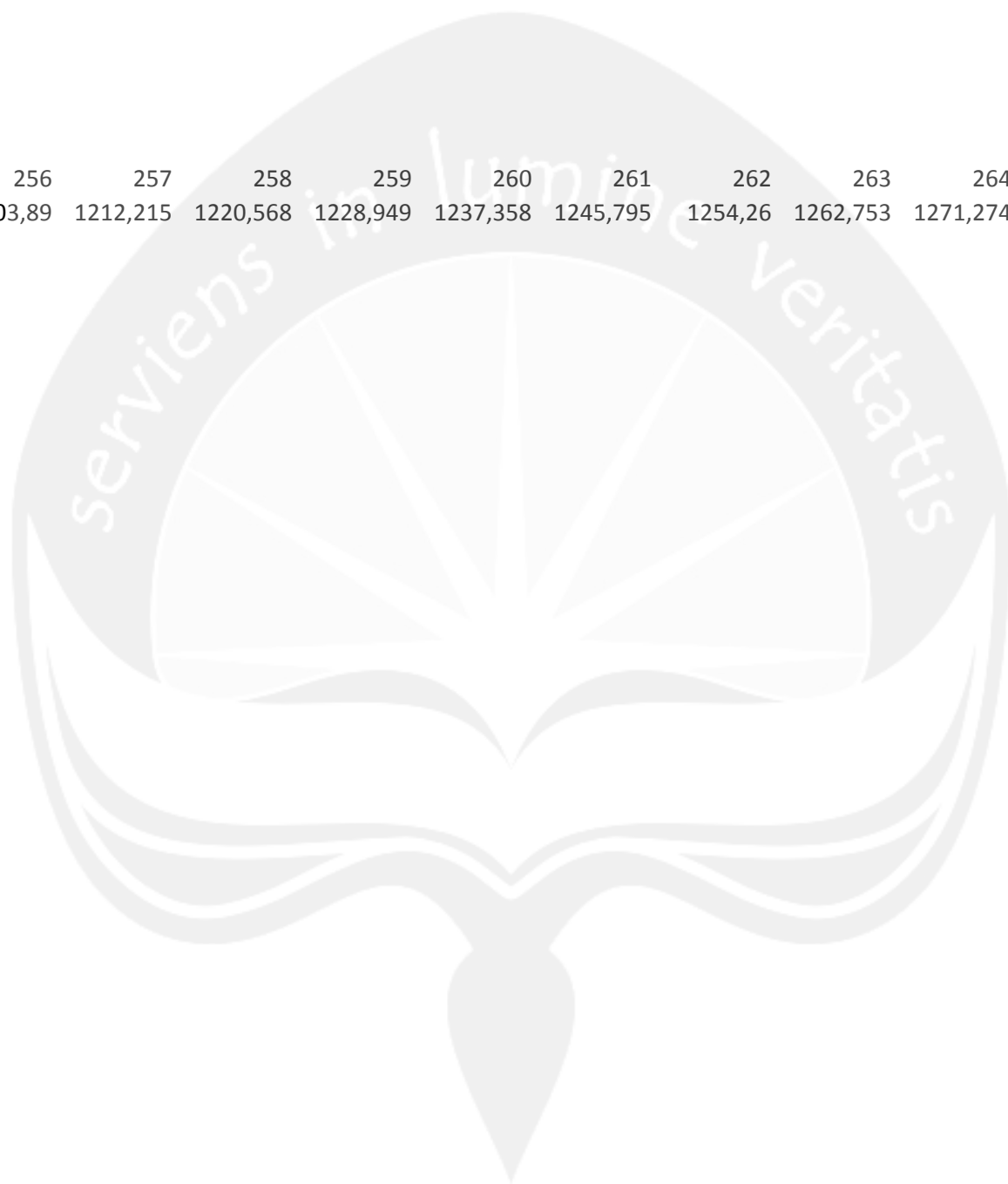
247	248	249	250	251	252	253	254	255
971,4669	975,4844	979,5021	983,52	987,5381	991,5564	995,5749	999,5936	1003,613

247	248	249	250	251	252	253	254	255
1130,225	1138,298	1146,399	1154,528	1162,685	1170,87	1179,083	1187,324	1195,593



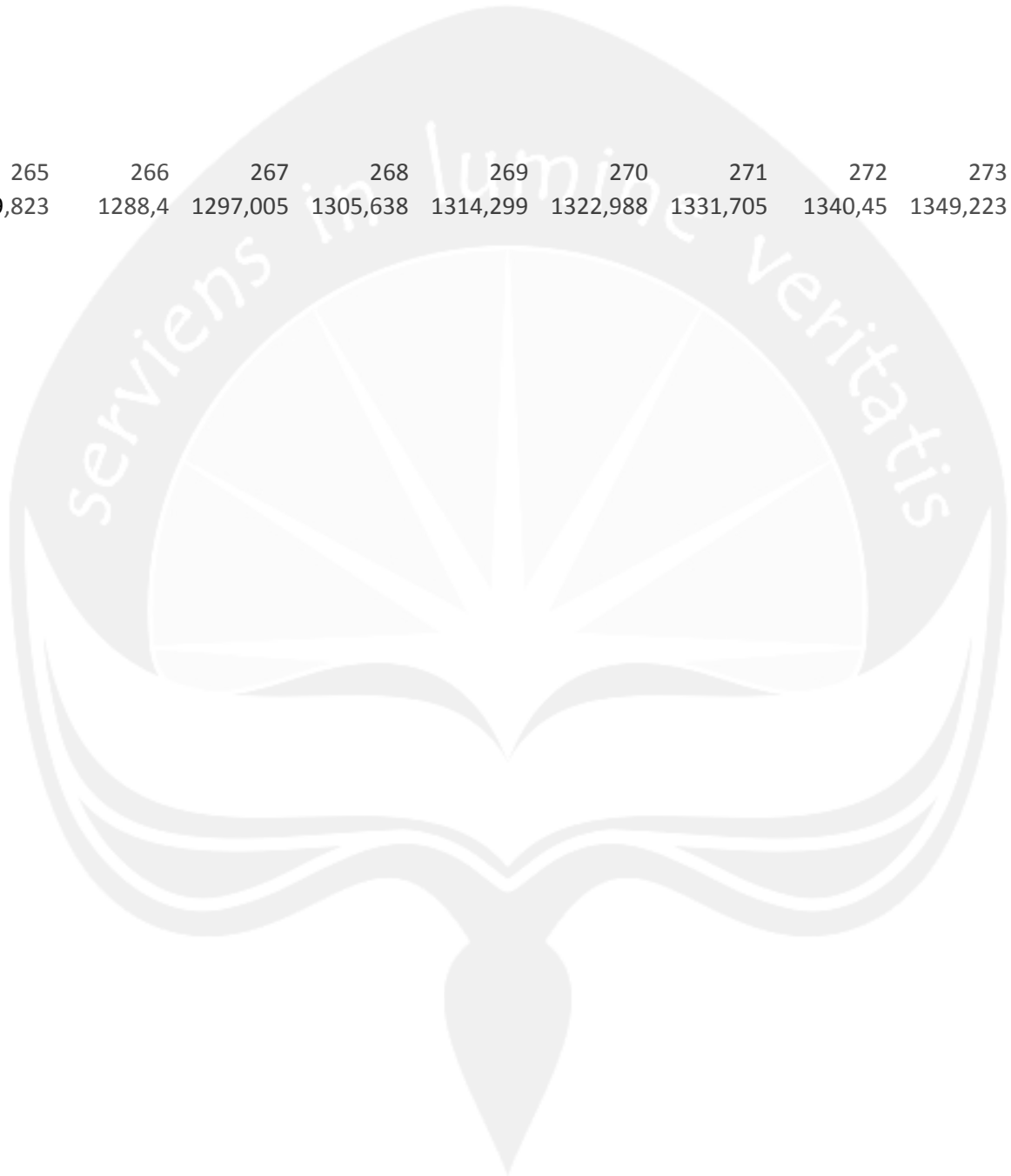
256	257	258	259	260	261	262	263	264
1007,632	1011,651	1015,67	1019,69	1023,71	1027,73	1031,75	1035,771	1039,792

256	257	258	259	260	261	262	263	264
1203,89	1212,215	1220,568	1228,949	1237,358	1245,795	1254,26	1262,753	1271,274



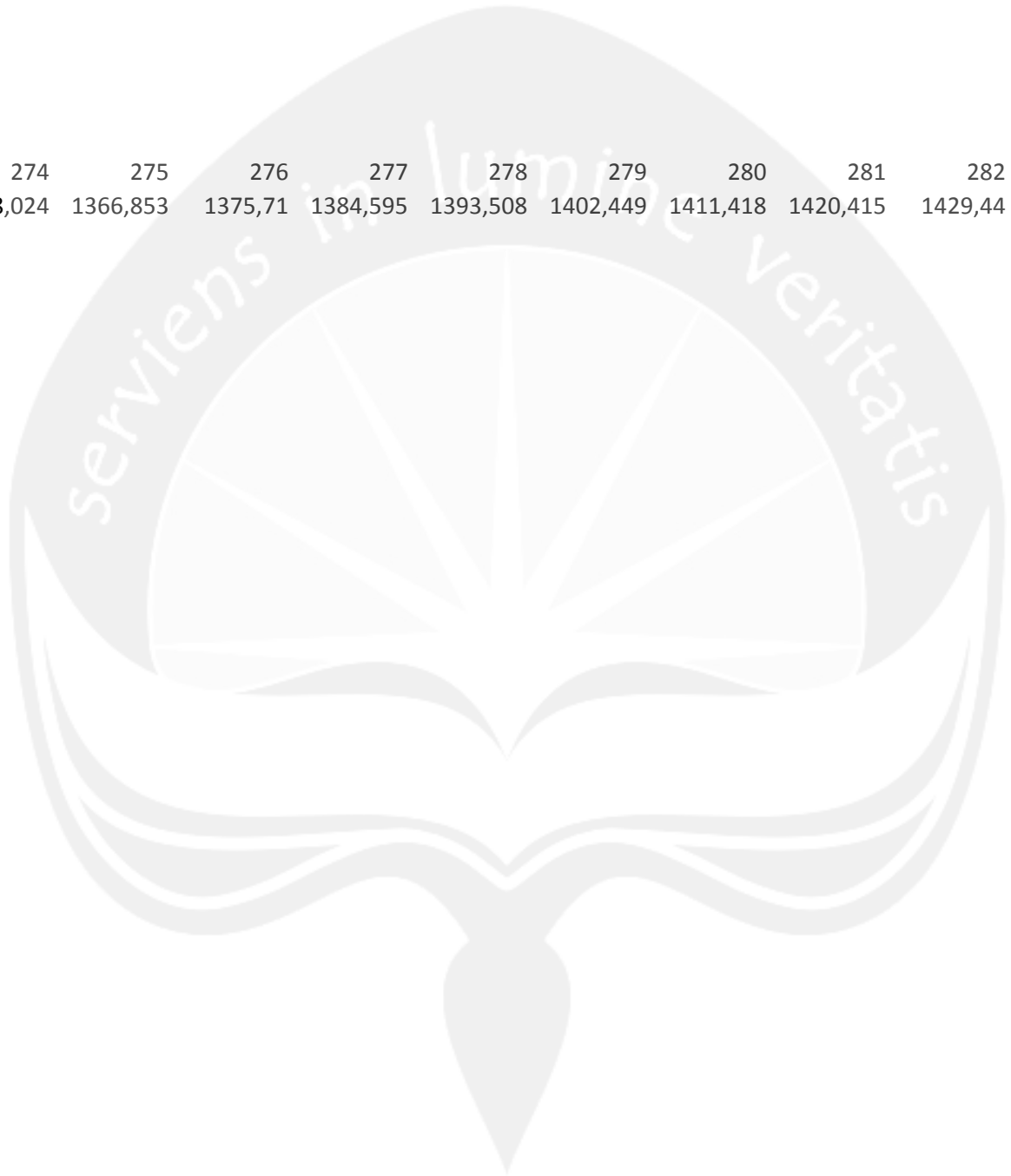
265	266	267	268	269	270	271	272	273
1043,813	1047,834	1051,855	1055,876	1059,898	1063,92	1067,942	1071,964	1075,987

265	266	267	268	269	270	271	272	273
1279,823	1288,4	1297,005	1305,638	1314,299	1322,988	1331,705	1340,45	1349,223



274	275	276	277	278	279	280	281	282
1080,01	1084,033	1088,056	1092,079	1096,102	1100,126	1104,15	1108,174	1112,198

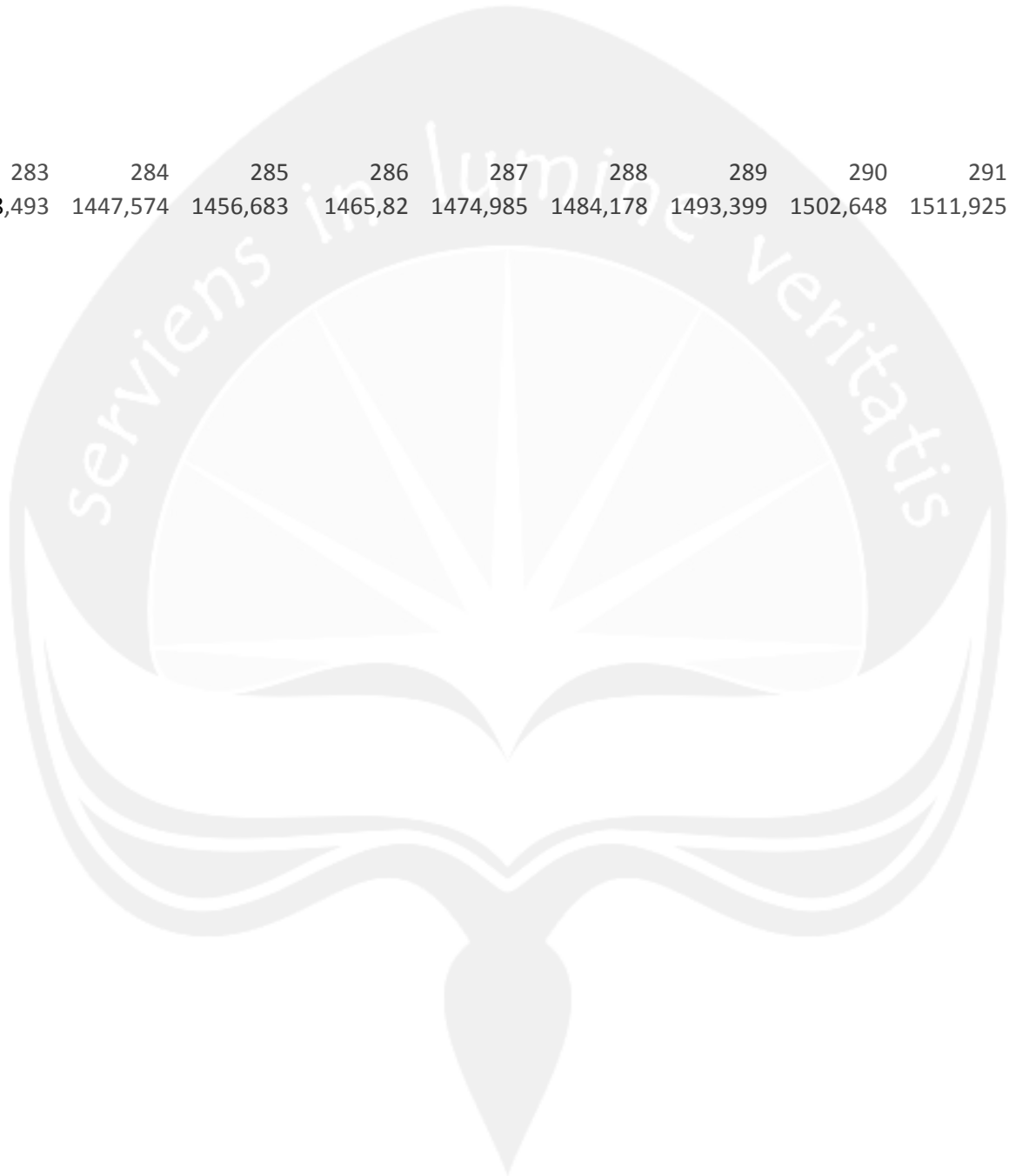
274	275	276	277	278	279	280	281	282
1358,024	1366,853	1375,71	1384,595	1393,508	1402,449	1411,418	1420,415	1429,44





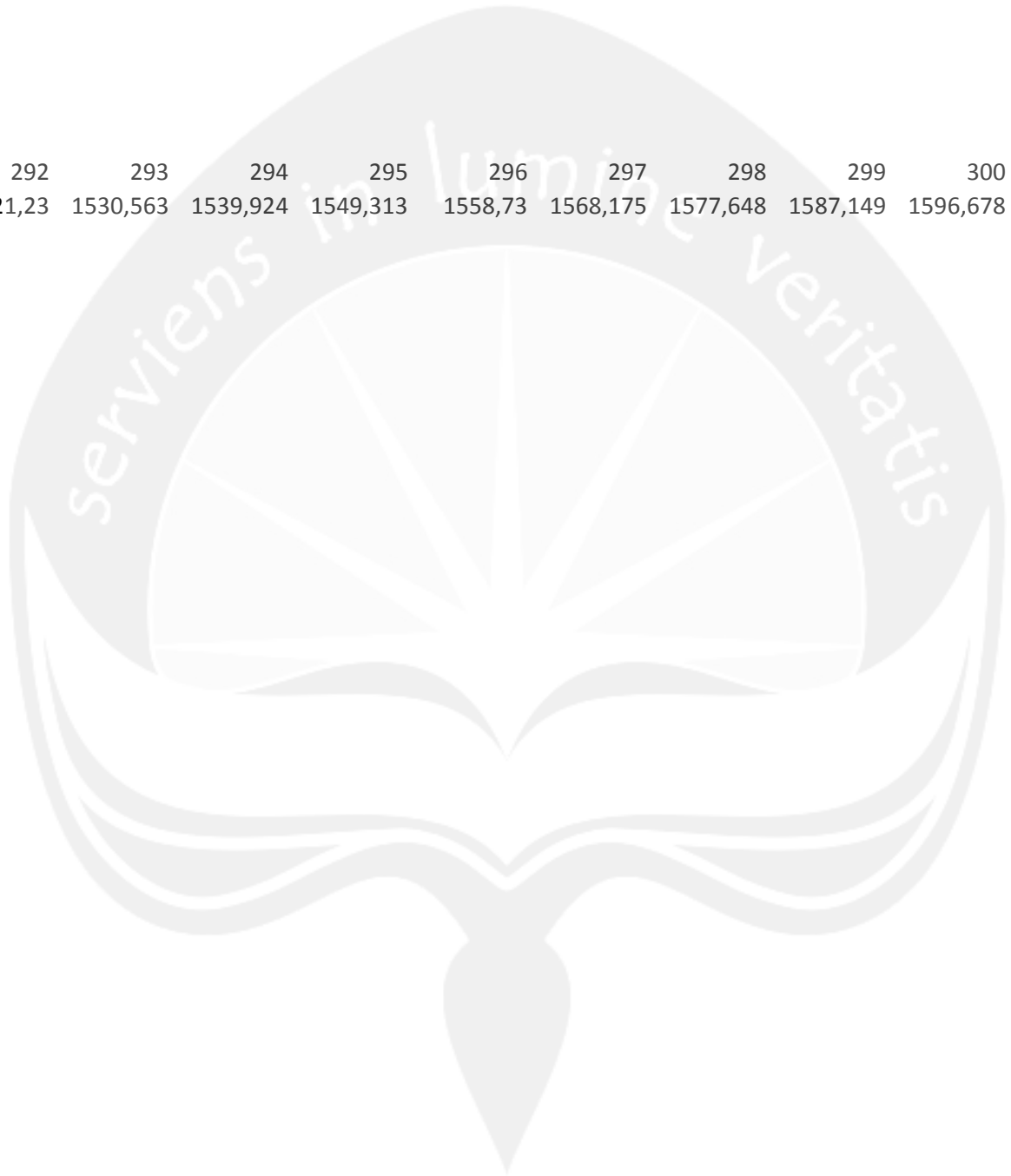
283	284	285	286	287	288	289	290	291
1116,223	1120,248	1124,273	1128,298	1132,323	1136,348	1140,374	1144,4	1148,426

283	284	285	286	287	288	289	290	291
1438,493	1447,574	1456,683	1465,82	1474,985	1484,178	1493,399	1502,648	1511,925

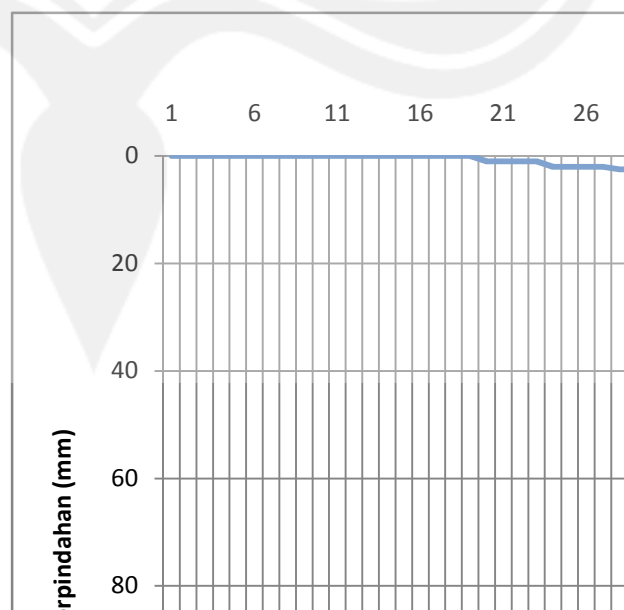


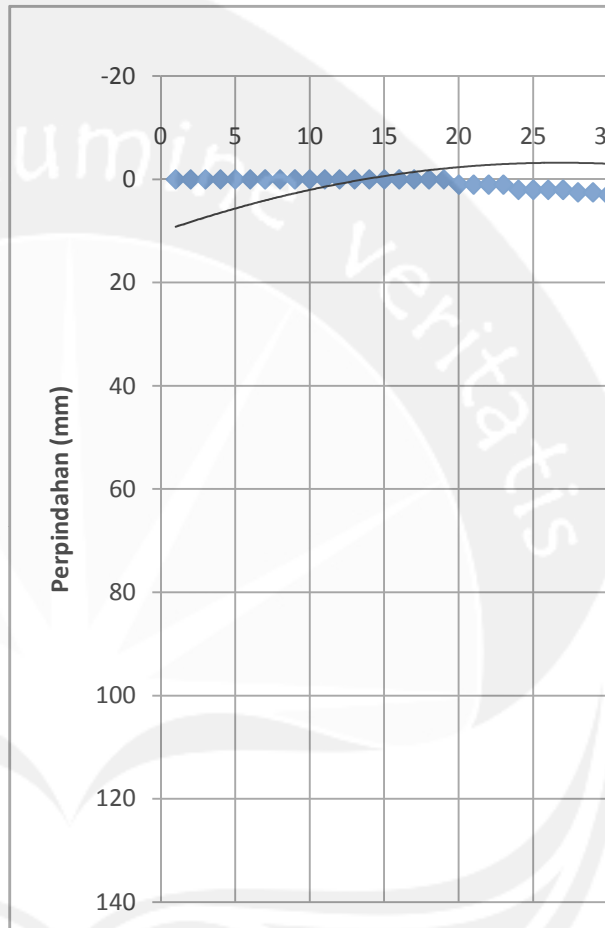
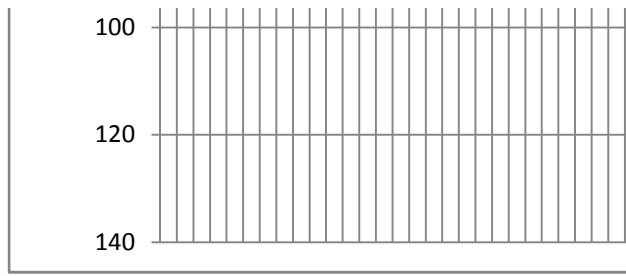
292	293	294	295	296	297	298	299	300
1152,452	1156,479	1160,506	1164,533	1168,56	1172,587	1176,614	1180,642	1184,67

292	293	294	295	296	297	298	299	300
1521,23	1530,563	1539,924	1549,313	1558,73	1568,175	1577,648	1587,149	1596,678



Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	31	3	61
2	0	32	3	62
3	0	33	3	63
4	0	34	3	64
5	0	35	3	65
6	0	36	5	66
7	0	37	5	67
8	0	38	5,5	68
9	0	39	5,5	69
10	0	40	5,5	70
11	0	41	5,5	71
12	0	42	6	72
13	0	43	6	73
14	0	44	6	74
15	0	45	6	75
16	0	46	7	76
17	0	47	7	77
18	0	48	8,5	78
19	0	49	8,5	79
20	1	50	9	80
21	1	51	9	81
22	1	52	11,5	82
23	1	53	11,5	83
24	2	54	12	84
25	2	55	12	85
26	2	56	12	86
27	2	57	12	87
28	2,5	58	12	88
29	2,5	59	13	89
30	3	60	13	90

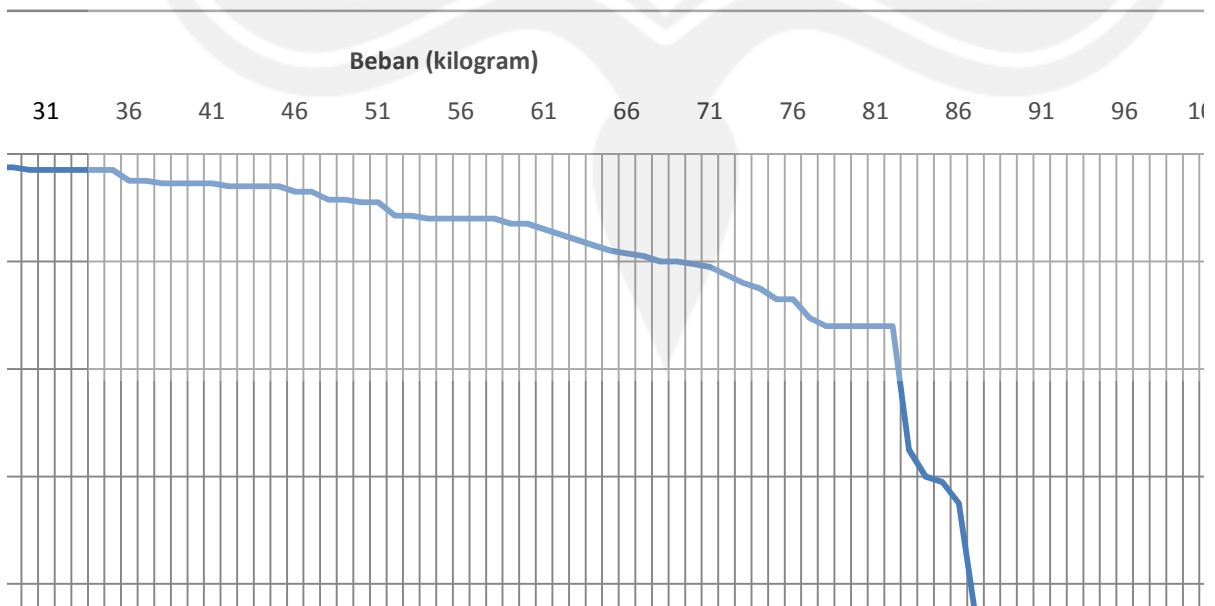


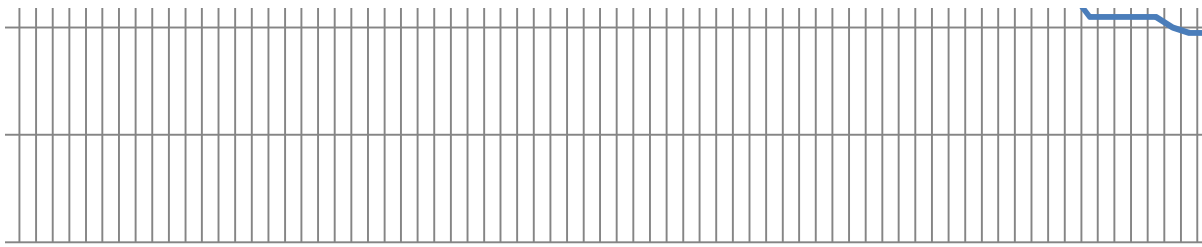


Perpindahan	Beban	Perpindahan
14	91	92
15	92	94
16	93	94
17	94	98
18	95	98
18,5	96	98
19	97	98
20	98	98
20	99	100
20,5	100	101
21	101	101
22,5	102	101
24	103	101
25	104	104
27	105	105
27	106	109
30,5	107	109
32	108	109
32	109	115
32		
32		
32		
55		
60		
61		
65		
86		
86		
86		
92		

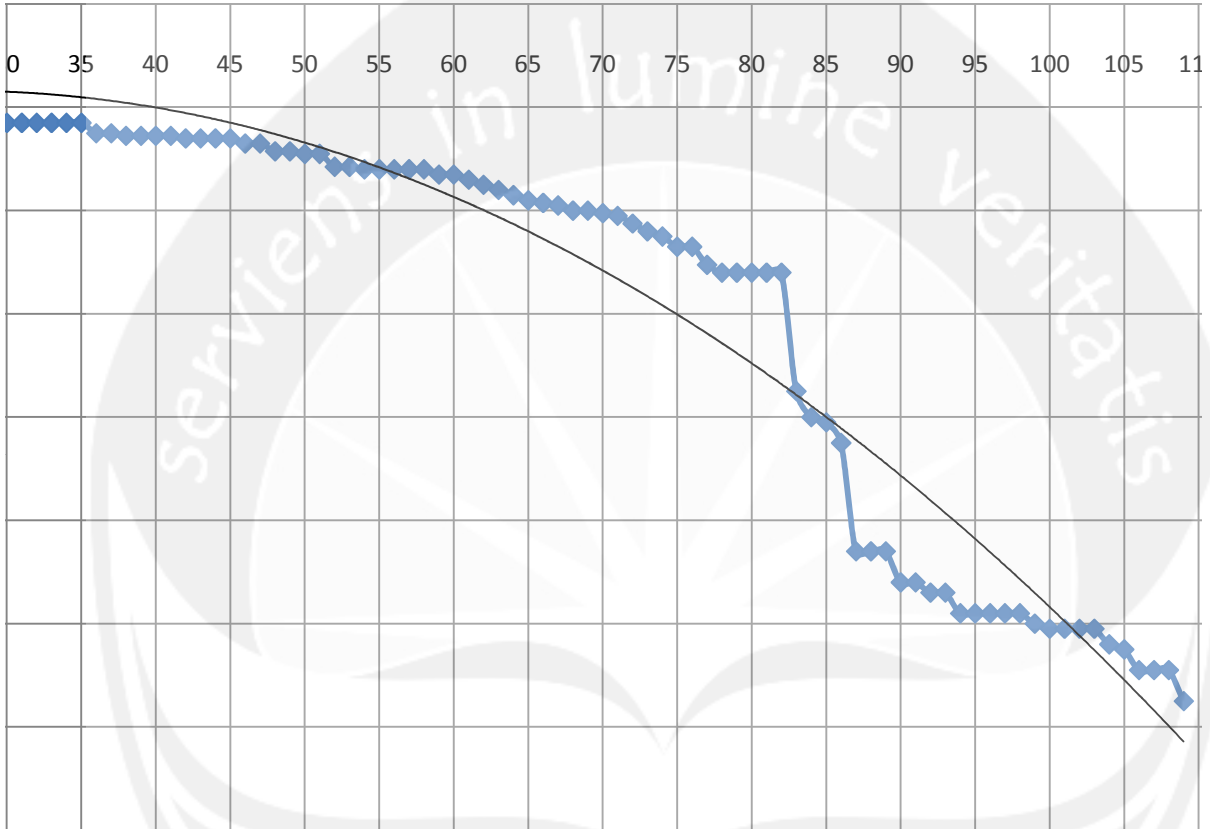
Beban = @200 Kg  
 Beban Total = Beban+berat bak-be  
**29,635 Kg**

Beban=109x200=21.8kg  
 B.Bak=9.3kg  
 Berat poer=1465 gr

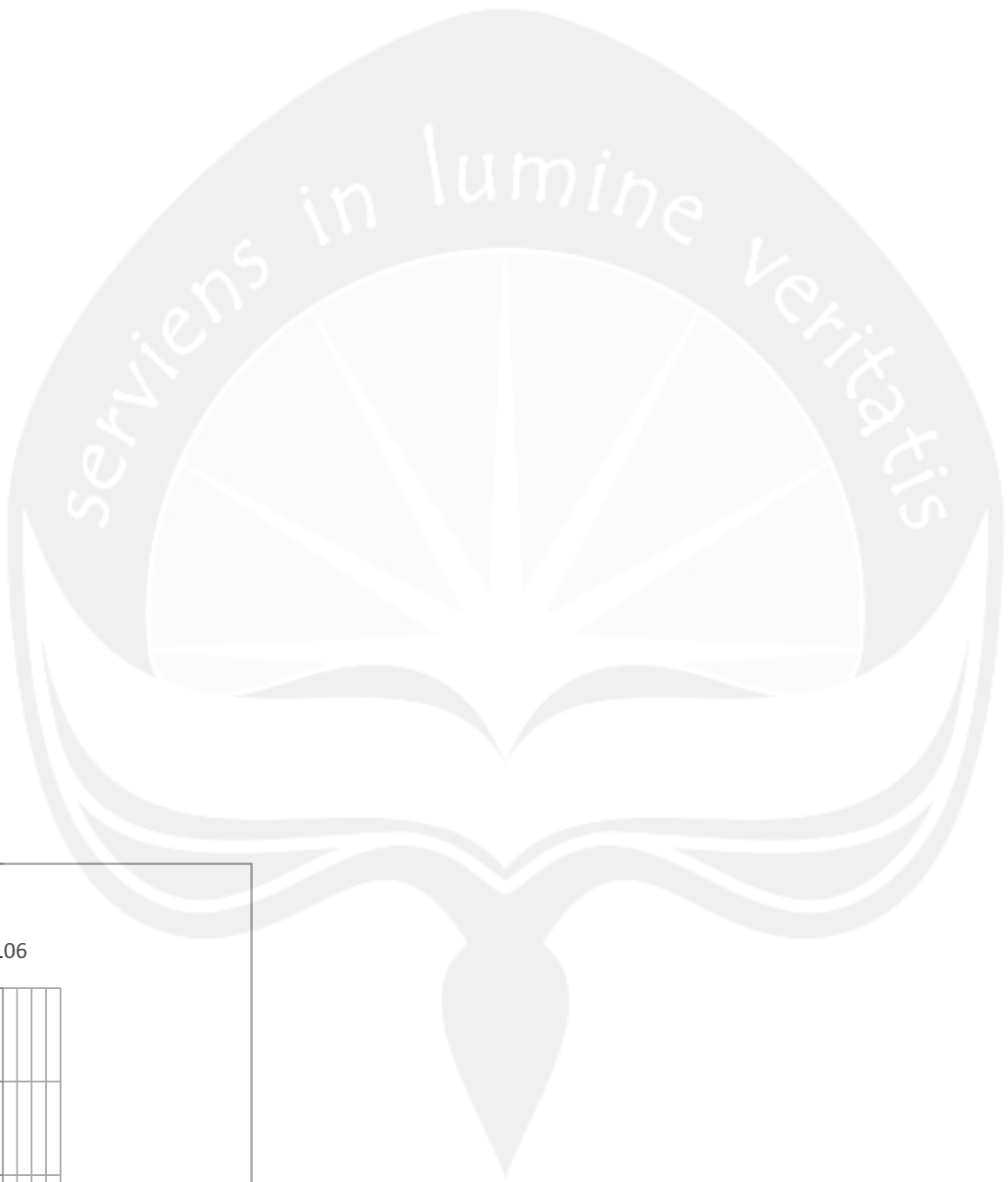




Beban (kilogram)

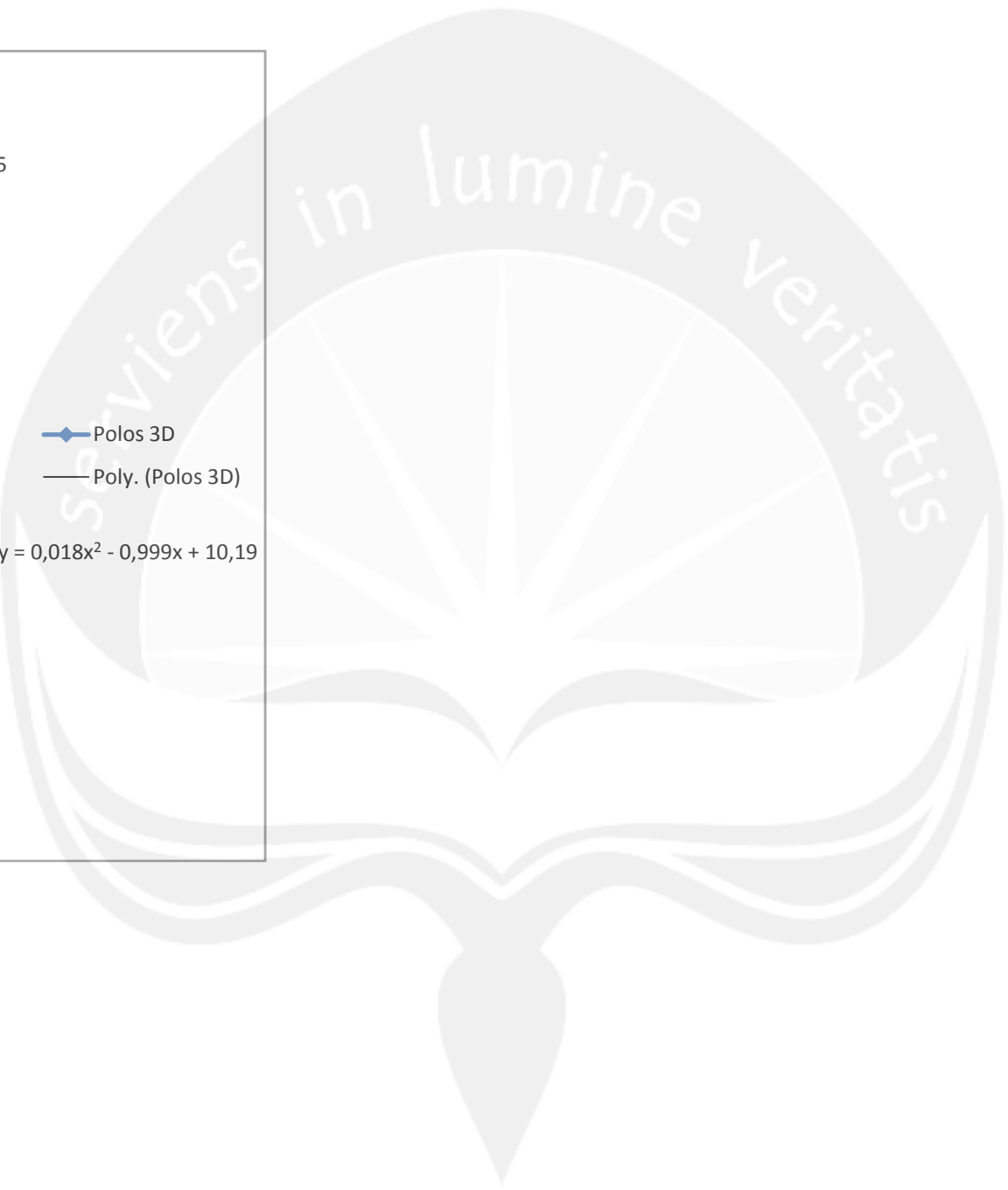
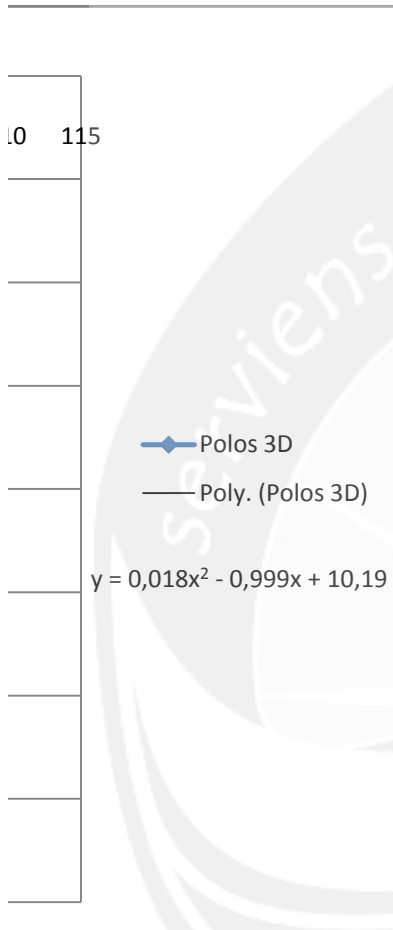
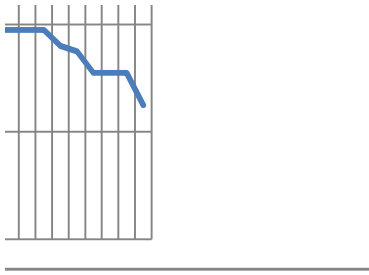


berat poe

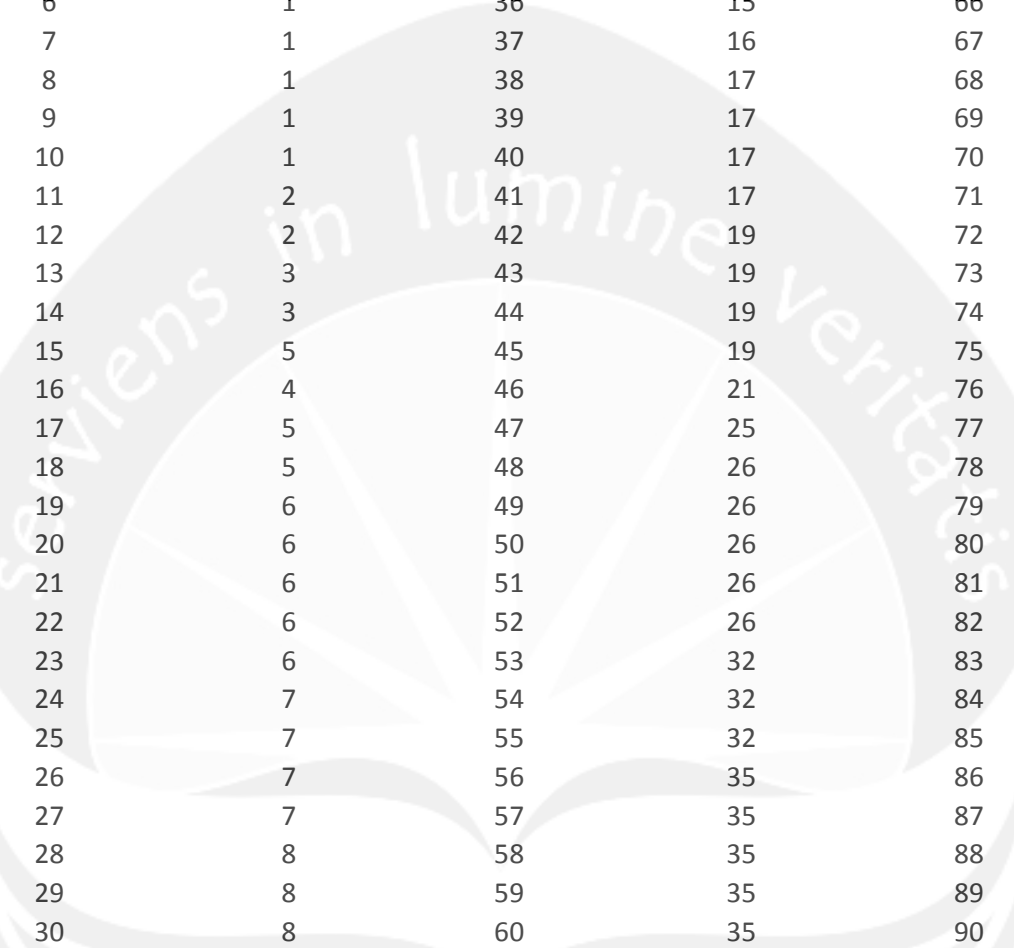


01 106


— Polos 3D



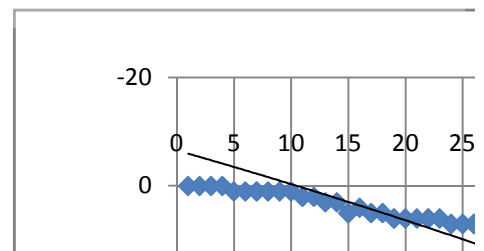
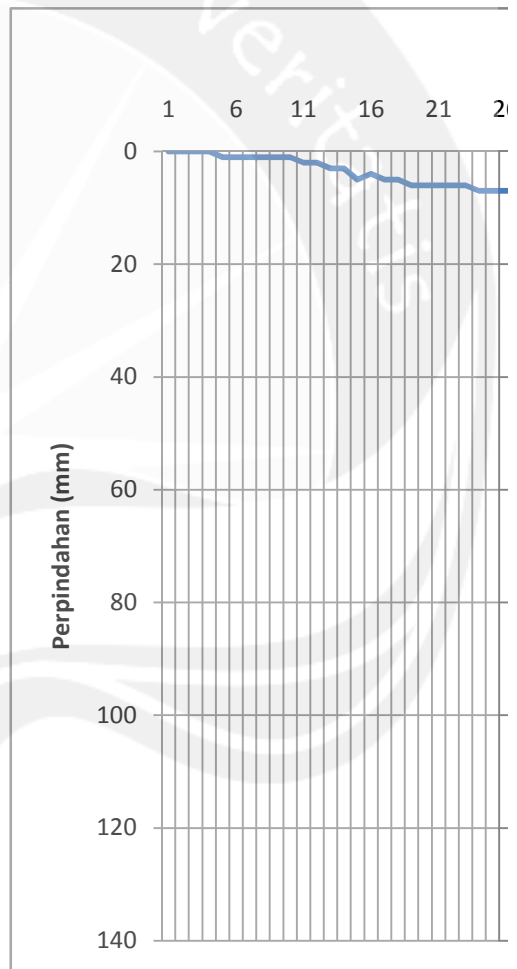


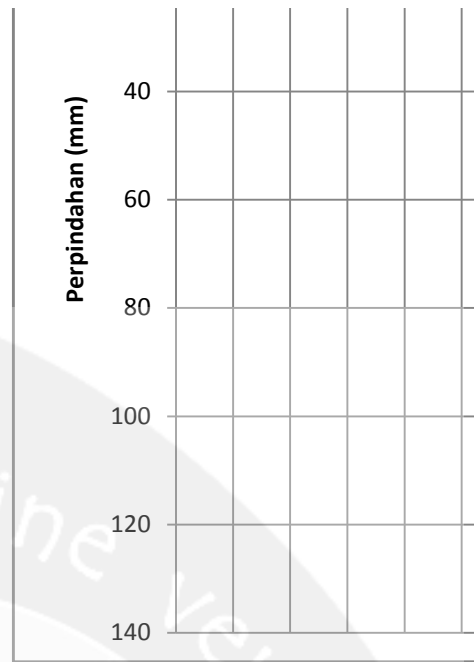
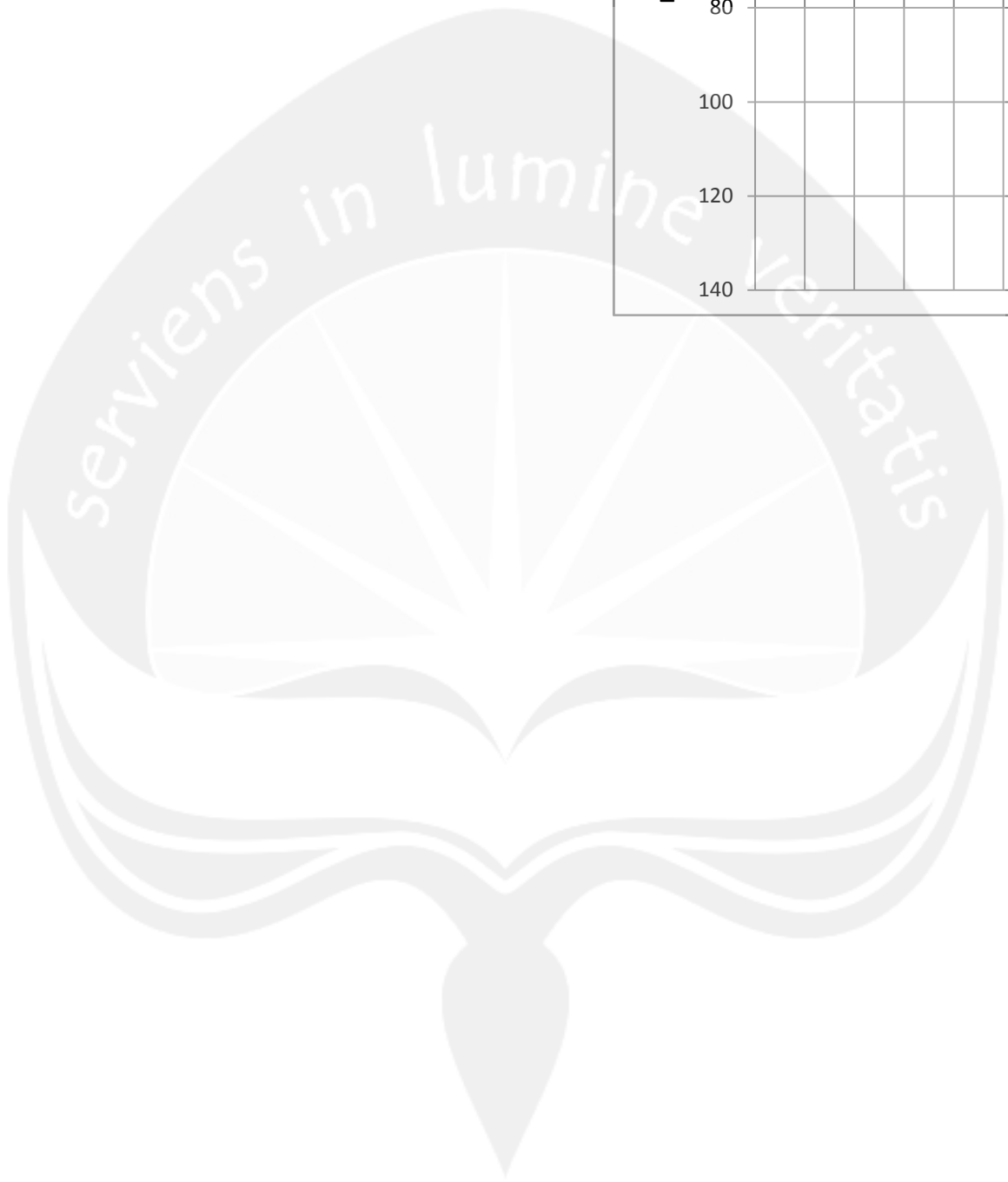


Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	31	9	61
2	0	32	10	62
3	0	33	11	63
4	0	34	12	64
5	1	35	13	65
6	1	36	15	66
7	1	37	16	67
8	1	38	17	68
9	1	39	17	69
10	1	40	17	70
11	2	41	17	71
12	2	42	19	72
13	3	43	19	73
14	3	44	19	74
15	5	45	19	75
16	4	46	21	76
17	5	47	25	77
18	5	48	26	78
19	6	49	26	79
20	6	50	26	80
21	6	51	26	81
22	6	52	26	82
23	6	53	32	83
24	7	54	32	84
25	7	55	32	85
26	7	56	35	86
27	7	57	35	87
28	8	58	35	88
29	8	59	35	89
30	8	60	35	90



Perpindahan	Beban	Perpindahan	Beban	Perpindahan
36	91	65	121	99
37	92	65	122	99
37	93	65	123	100
37	94	70	124	100
37	95	70	125	100
37	96	70	126	100
37	97	70	127	100
57	98	73	128	100
58	99	80	129	122
58	100	80	130	122
58	101	80	131	131
60	102	80		
60	103	80		
60	104	80		
61	105	80		
62	106	80		
62	107	80		
62	108	80		
62	109	80		
62	110	80		
64	111	80		
64	112	80		
64	113	80		
64	114	81		
64	115	82		
64	116	82		
65	117	89		
65	118	90		
65	119	92		
65	120	96		





Beban = @200 Kg

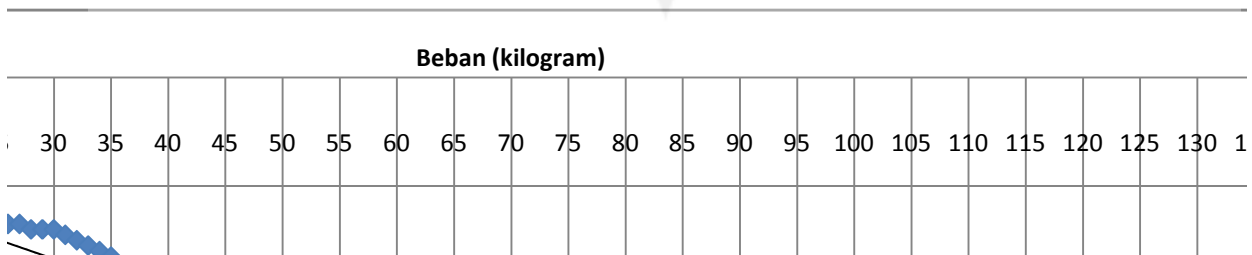
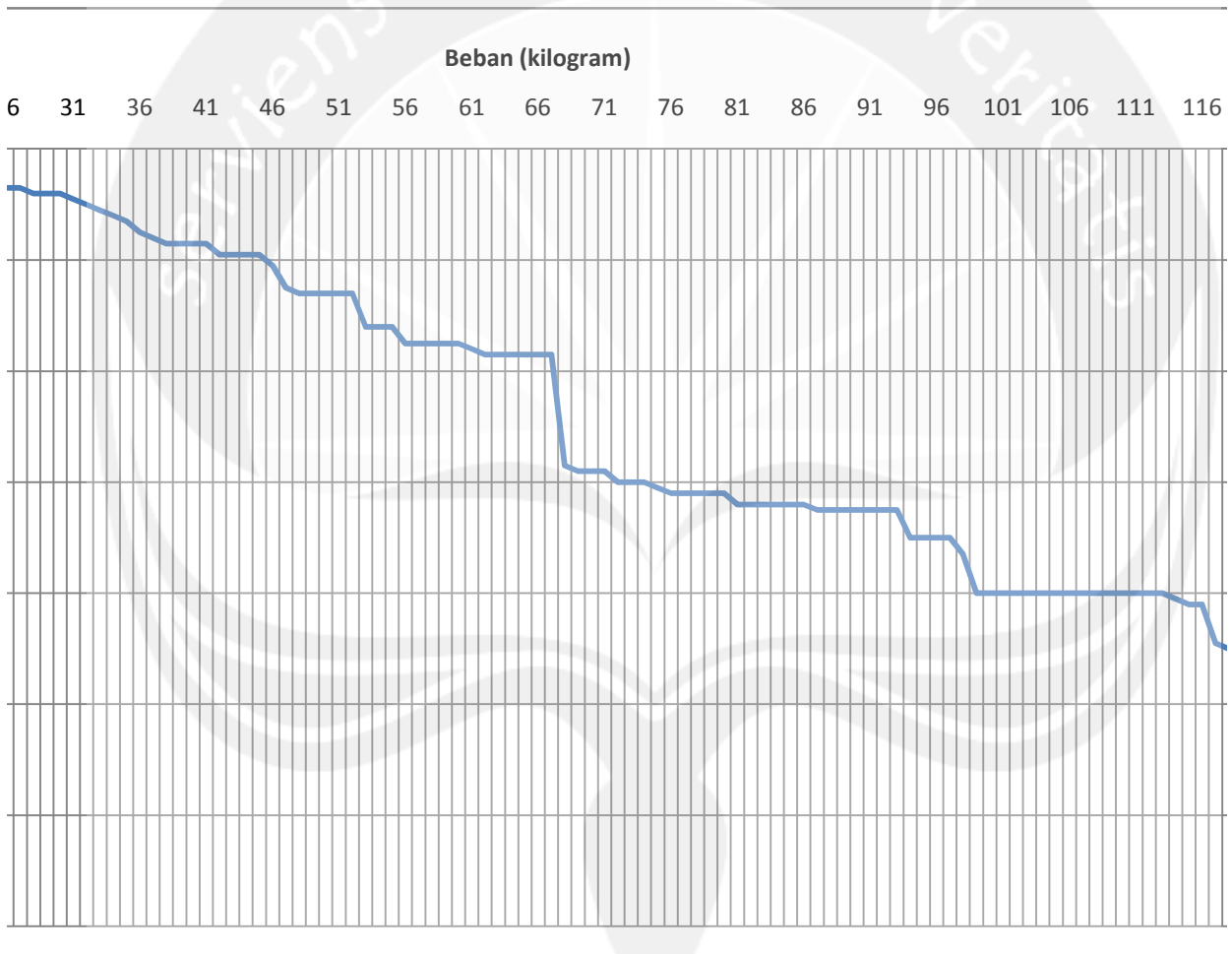
Beban Total = Beban+berat bak-berat poer

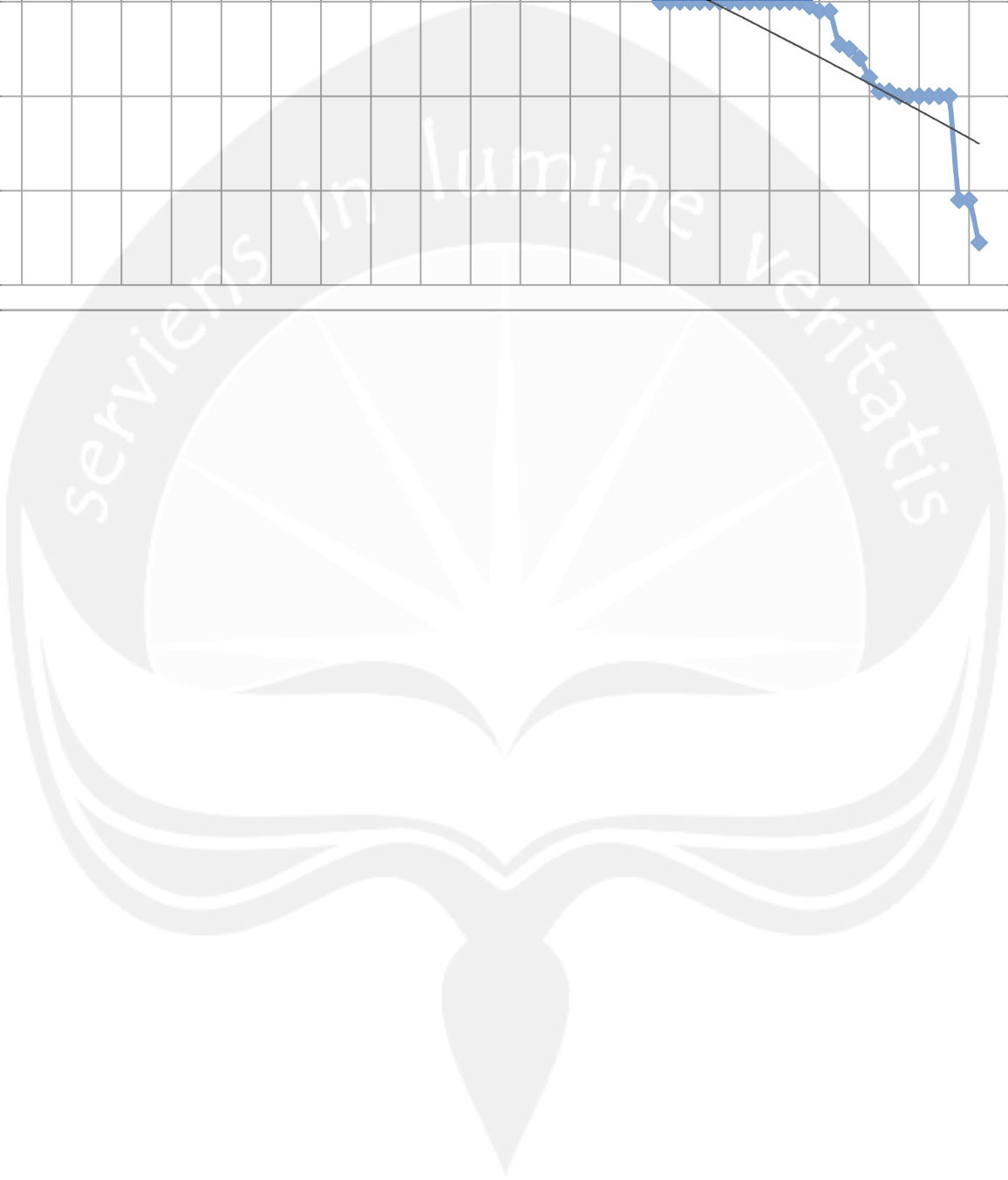
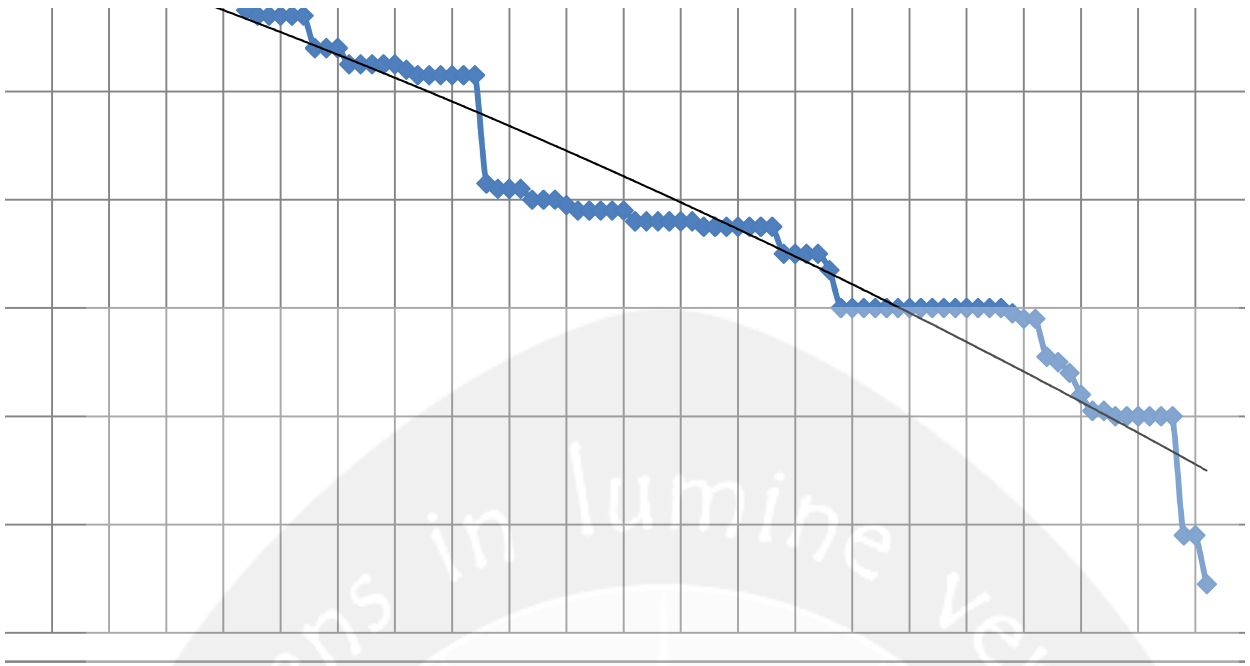
**34,035 Kg**

Beban=131x200=26.2kg

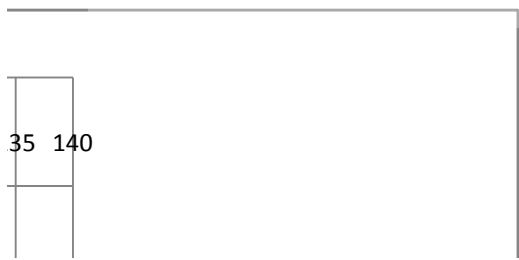
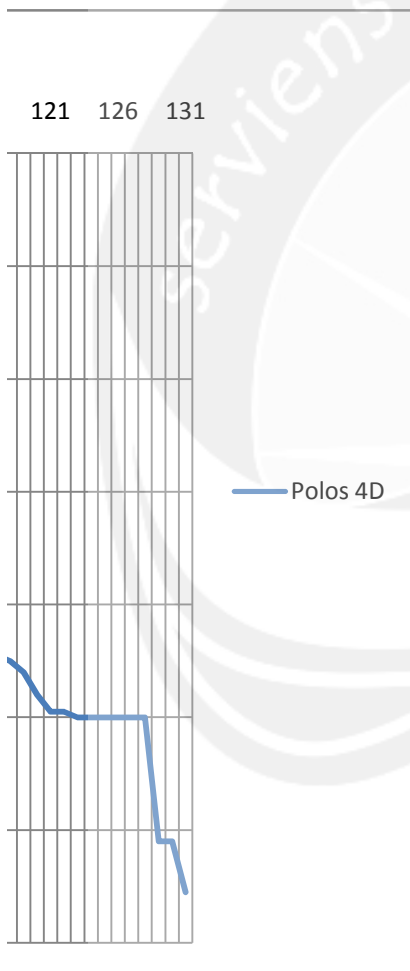
B.Bak=9.3kg

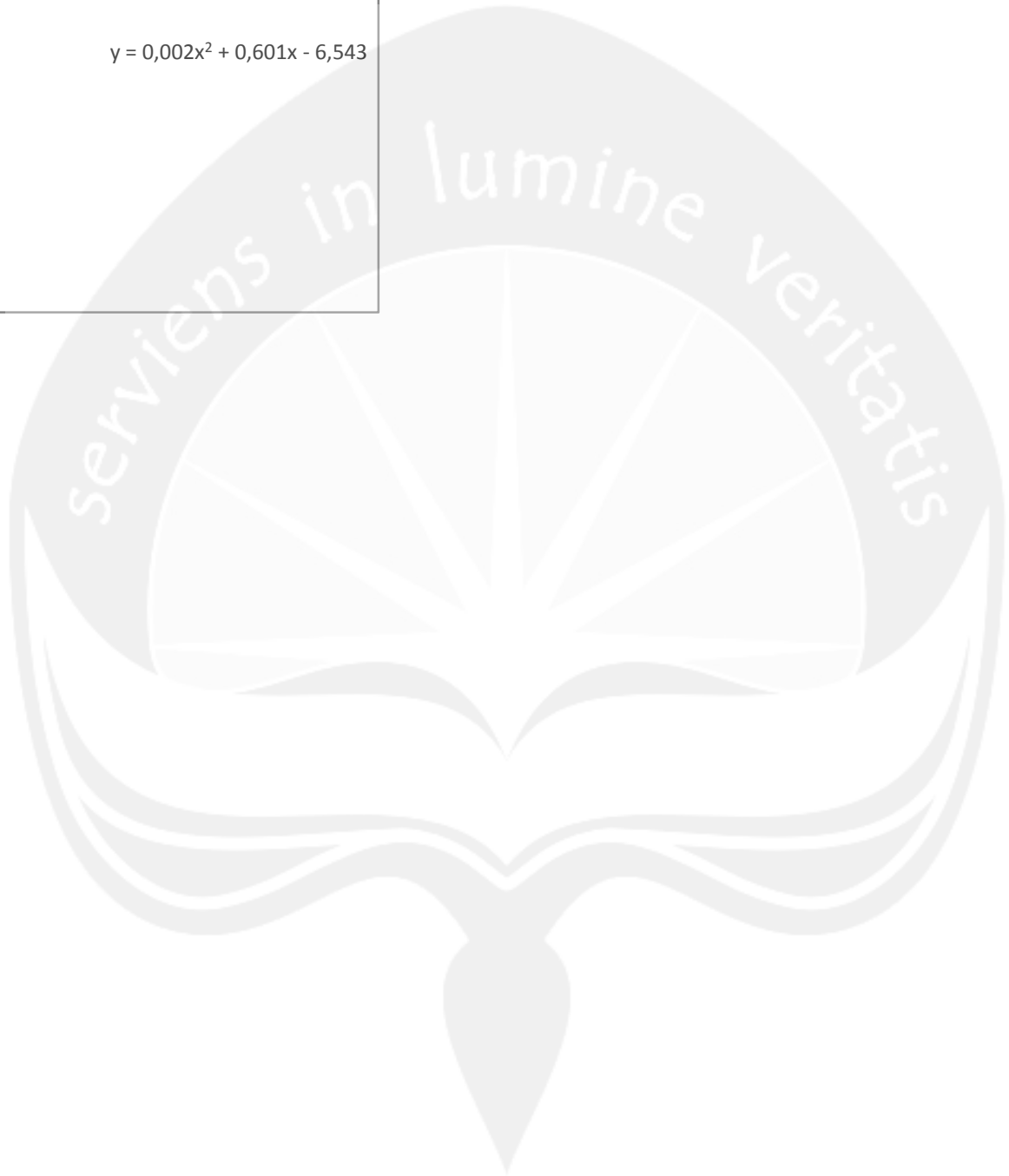
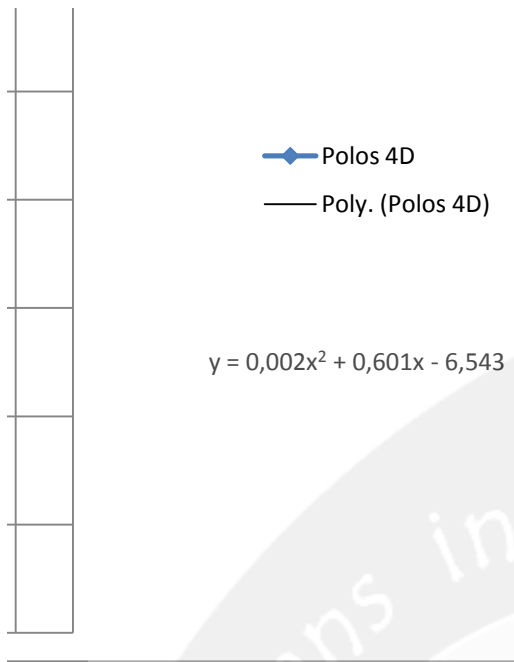
Berat poer=1465 gr



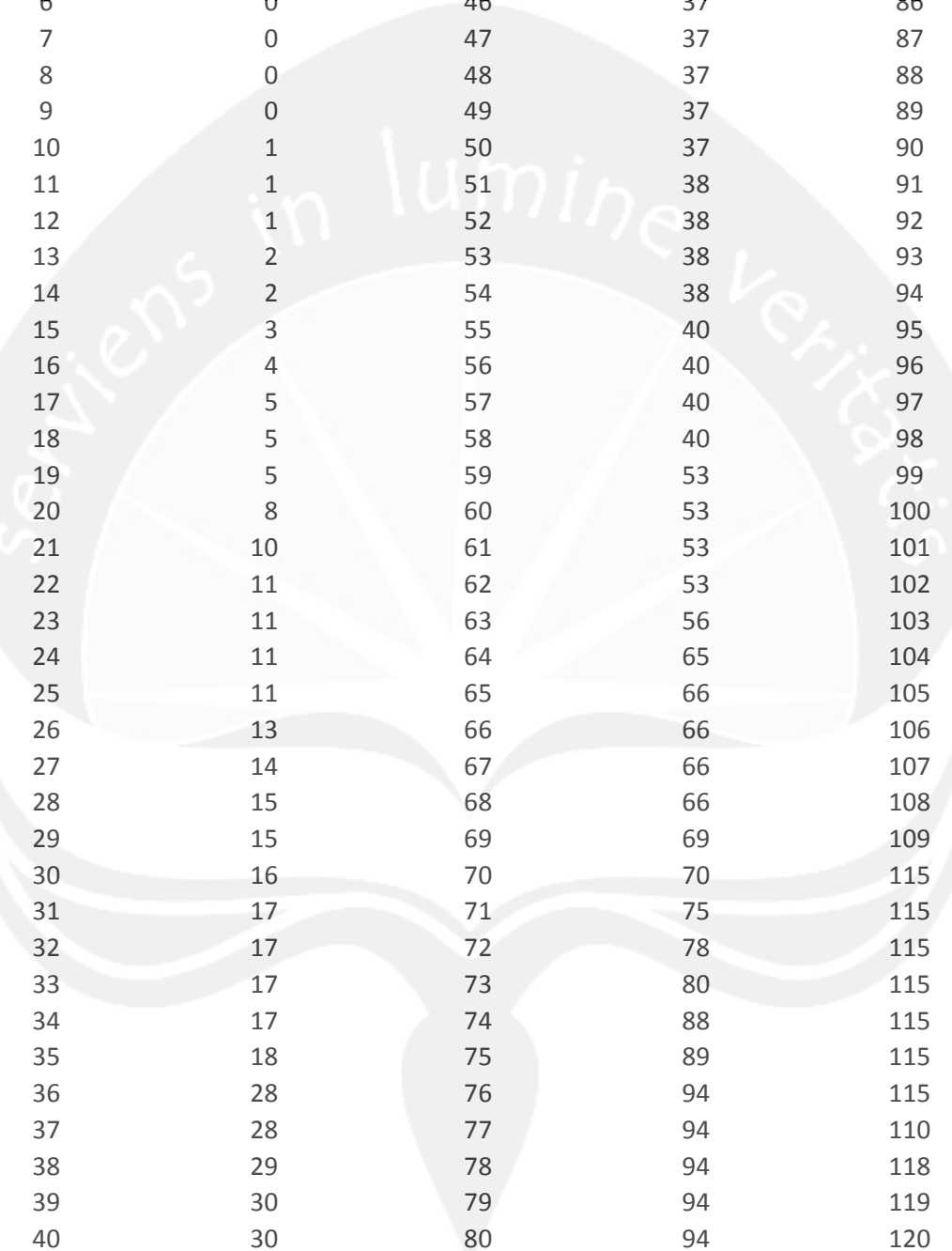


serviens in lumine veritatis





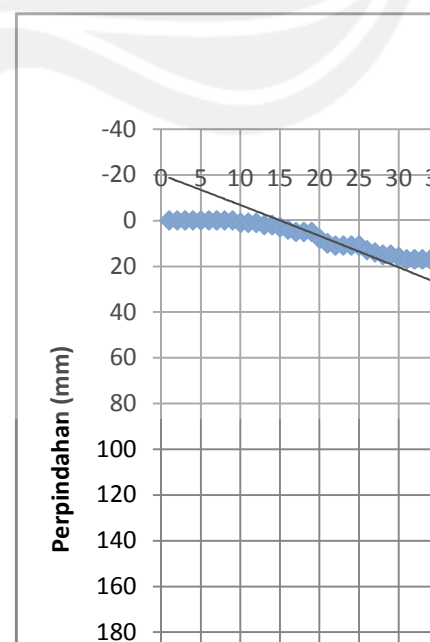
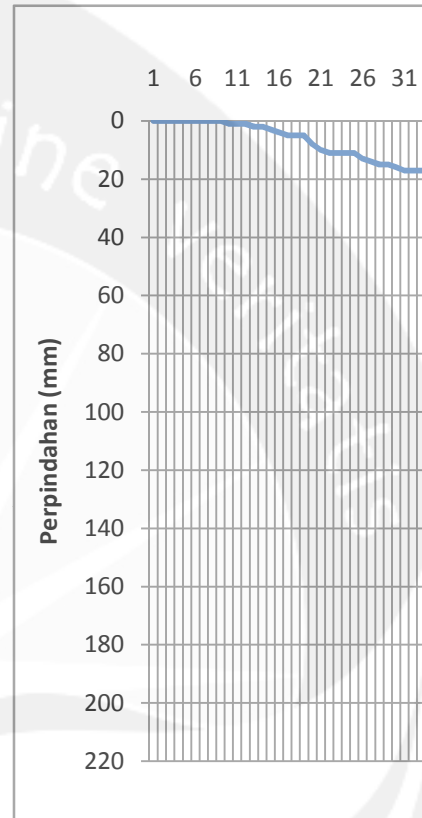




Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	41	32	81
2	0	42	33	82
3	0	43	34	83
4	0	44	35	84
5	0	45	36	85
6	0	46	37	86
7	0	47	37	87
8	0	48	37	88
9	0	49	37	89
10	1	50	37	90
11	1	51	38	91
12	1	52	38	92
13	2	53	38	93
14	2	54	38	94
15	3	55	40	95
16	4	56	40	96
17	5	57	40	97
18	5	58	40	98
19	5	59	53	99
20	8	60	53	100
21	10	61	53	101
22	11	62	53	102
23	11	63	56	103
24	11	64	65	104
25	11	65	66	105
26	13	66	66	106
27	14	67	66	107
28	15	68	66	108
29	15	69	69	109
30	16	70	70	115
31	17	71	75	115
32	17	72	78	115
33	17	73	80	115
34	17	74	88	115
35	18	75	89	115
36	28	76	94	115
37	28	77	94	110
38	29	78	94	118
39	30	79	94	119
40	30	80	94	120



Perpindahan	Beban	Perpindahan
98	121	178
98	122	179
98	123	179
98	124	180
98	125	180
98	126	180
100	127	181
100	128	181
105	129	181
105	130	182
105	131	182
105	132	183
112	133	184
112	134	184
112	135	190
112	136	190
112	137	190
112	138	190
112	139	190
112	140	191
124	141	191
125	142	191
136	143	191
136	144	191
136	145	191
158	146	191
158	147	191
158	148	193
158	149	193
158	150	193
158	151	196
158	152	196
158	153	196
177	154	196
177	155	196
177	156	197
178	157	197
178	158	197
178	159	197
178		197



220

240



Beban = @200 Kg

Beban Total = Beban+berat bak-berat poer

**39,635 Kg**

Beban=159x200=31.8kg

B.Bak=9.3kg

Berat poer=1465 gr

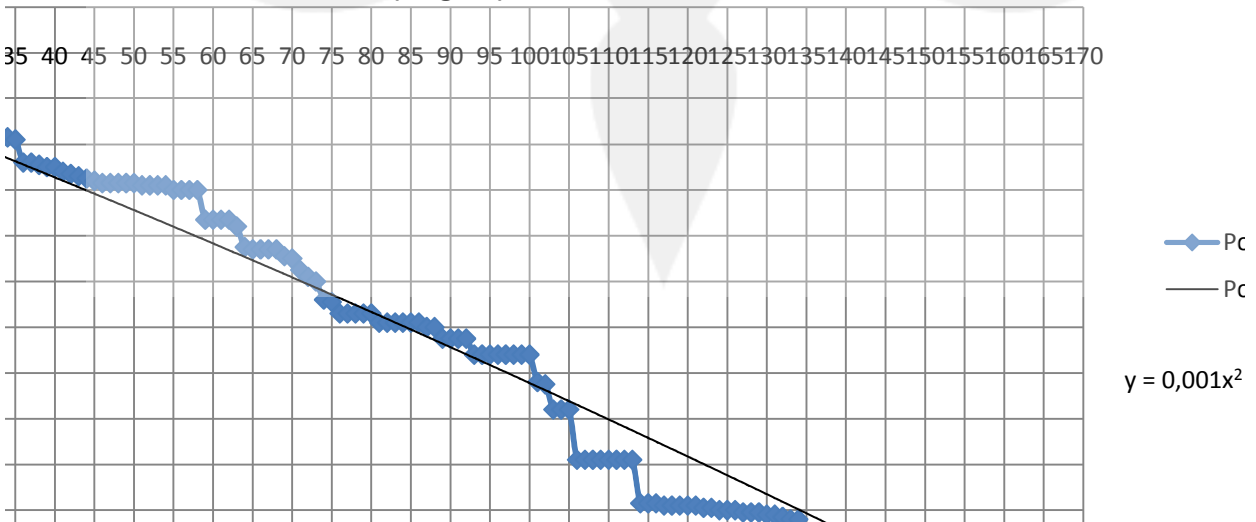
Beban (kilogram)

36 41 46 51 56 61 66 71 76 81 86 91 96 101 106 111 116 121 126 131 136 141 146 151 156



Beban (kilogram)

35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170







Polos 5D

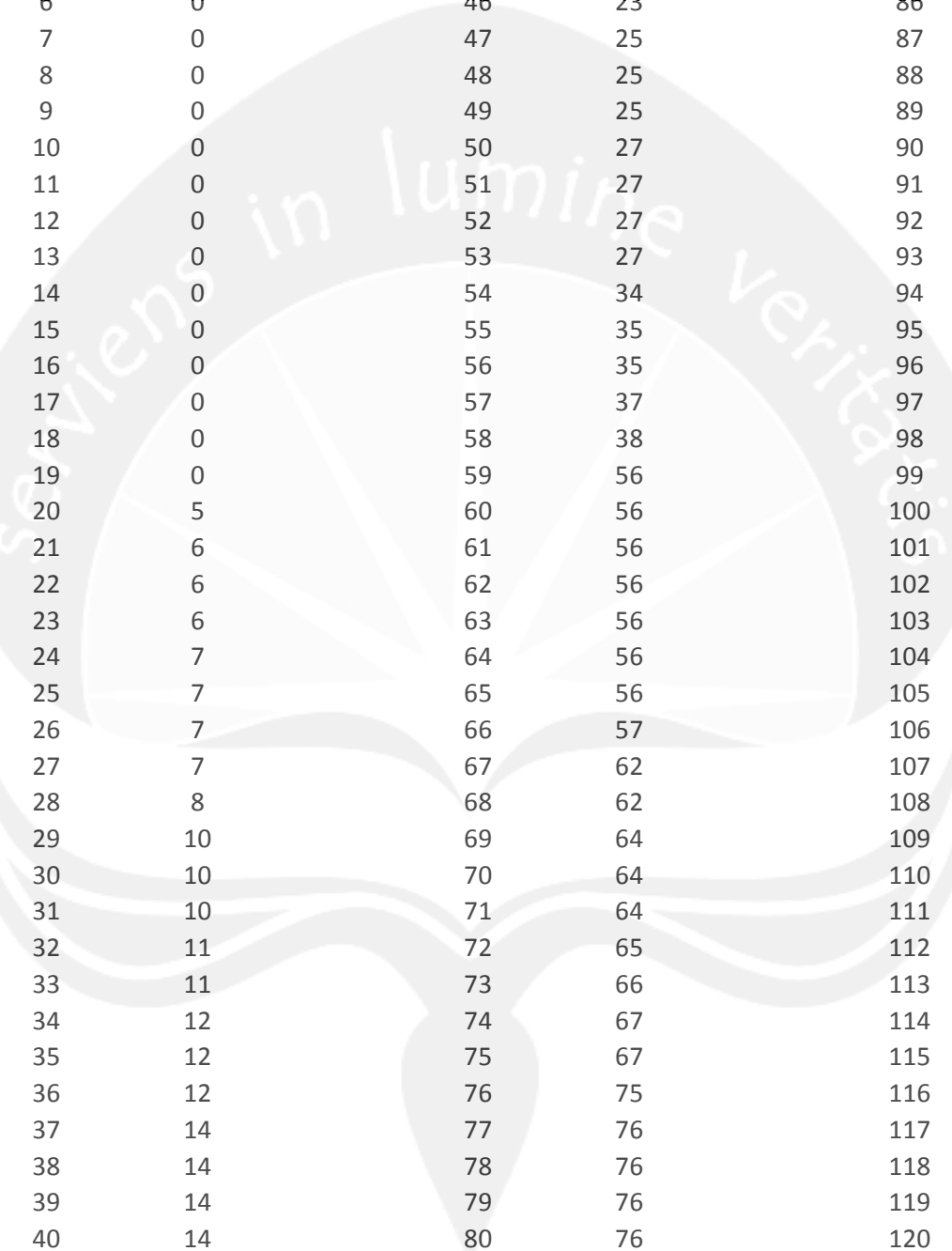
Polos 5D

Polos 5D (Polos 5D)

+ 1,307x - 19,93



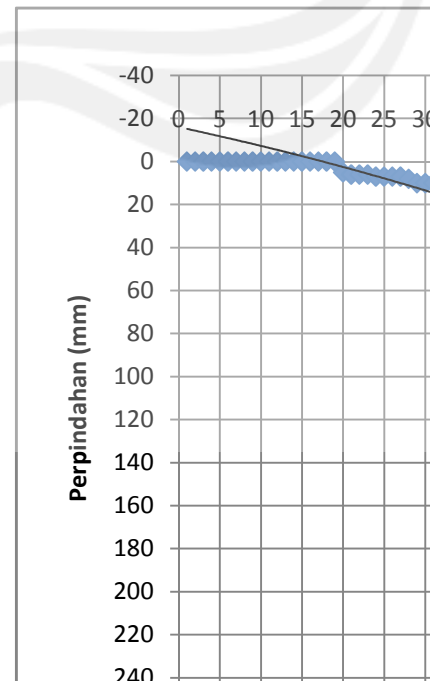
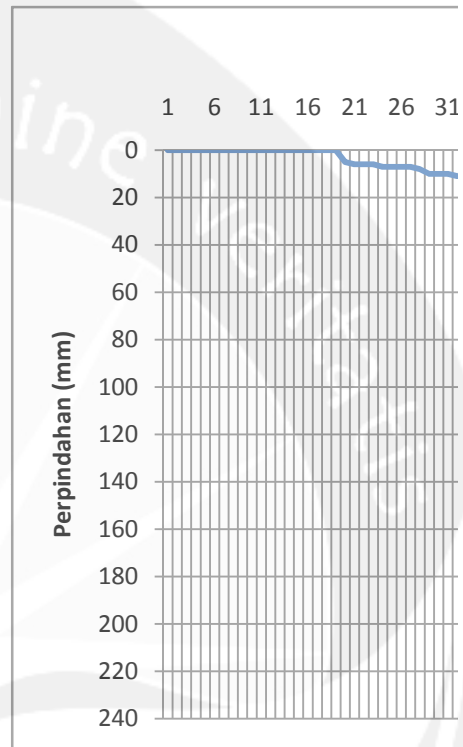




Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	41	20	81
2	0	42	20	82
3	0	43	23	83
4	0	44	23	84
5	0	45	23	85
6	0	46	23	86
7	0	47	25	87
8	0	48	25	88
9	0	49	25	89
10	0	50	27	90
11	0	51	27	91
12	0	52	27	92
13	0	53	27	93
14	0	54	34	94
15	0	55	35	95
16	0	56	35	96
17	0	57	37	97
18	0	58	38	98
19	0	59	56	99
20	5	60	56	100
21	6	61	56	101
22	6	62	56	102
23	6	63	56	103
24	7	64	56	104
25	7	65	56	105
26	7	66	57	106
27	7	67	62	107
28	8	68	62	108
29	10	69	64	109
30	10	70	64	110
31	10	71	64	111
32	11	72	65	112
33	11	73	66	113
34	12	74	67	114
35	12	75	67	115
36	12	76	75	116
37	14	77	76	117
38	14	78	76	118
39	14	79	76	119
40	14	80	76	120



Perpindahan	Beban	Perpindahan
81	121	174
81	122	176
81	123	177
82	124	177
85	125	177
88	126	179
88	127	182
88	128	182
92	129	182
93	130	183
93	131	185
104	132	185
104	133	185
121	134	186
121	135	188
121	136	189
136	137	190
136	138	195
136	139	195
136	140	195
136	141	196
136	142	196
142	143	197
142	144	197
148	145	197
149	146	198
152	147	198
153	148	198
155	149	212
155	150	216
155	151	221
155		
155		
168		
169		
170		
170		
170		
171		
171		





Beban = @ 1 Kg

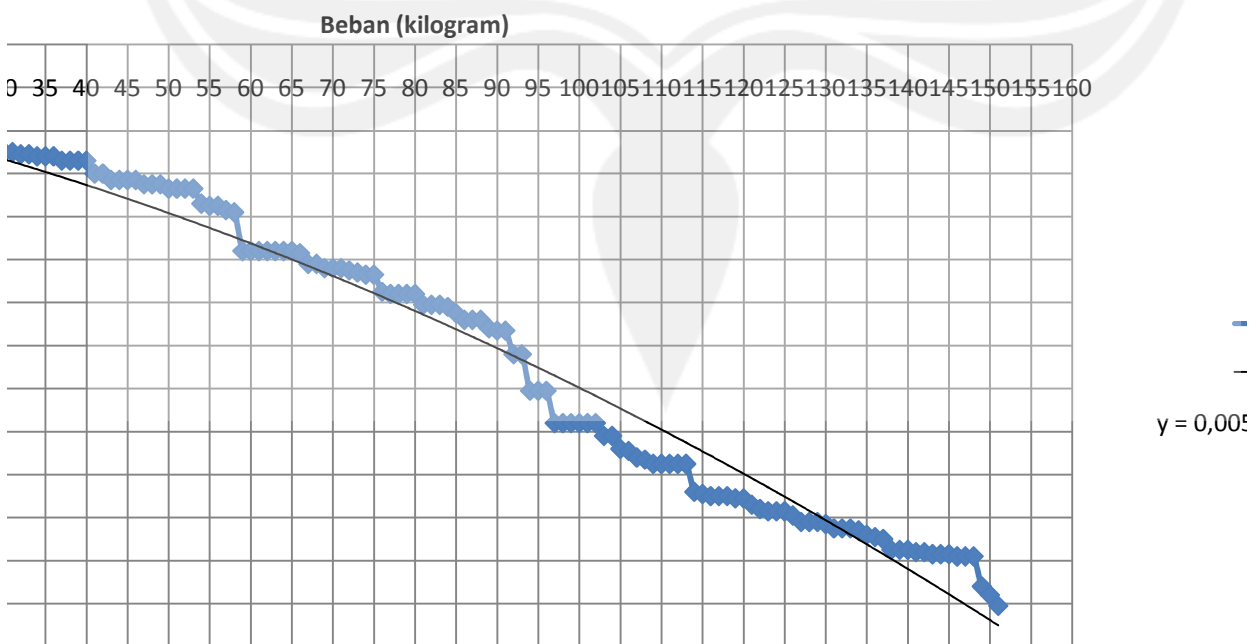
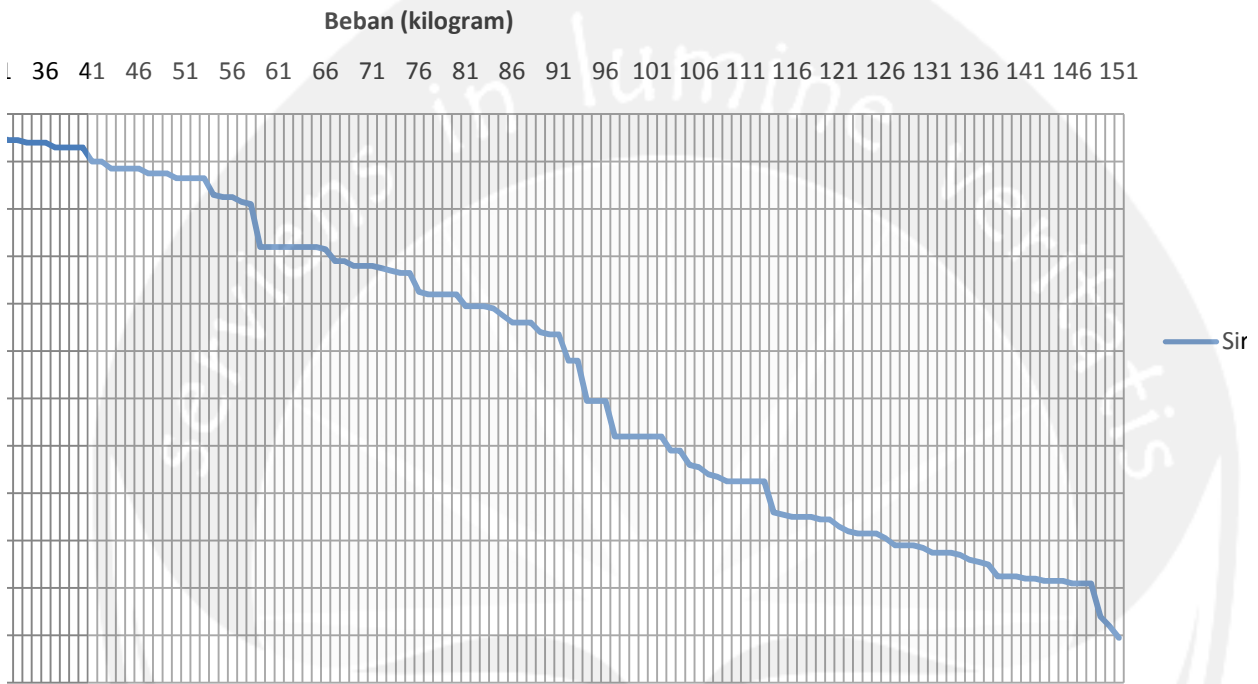
Beban Total = Beban+berat bak-berat poer

**158,84**

Beban=151x1=151kg

B.Bak=9.3kg

Berat poer=1465 gr





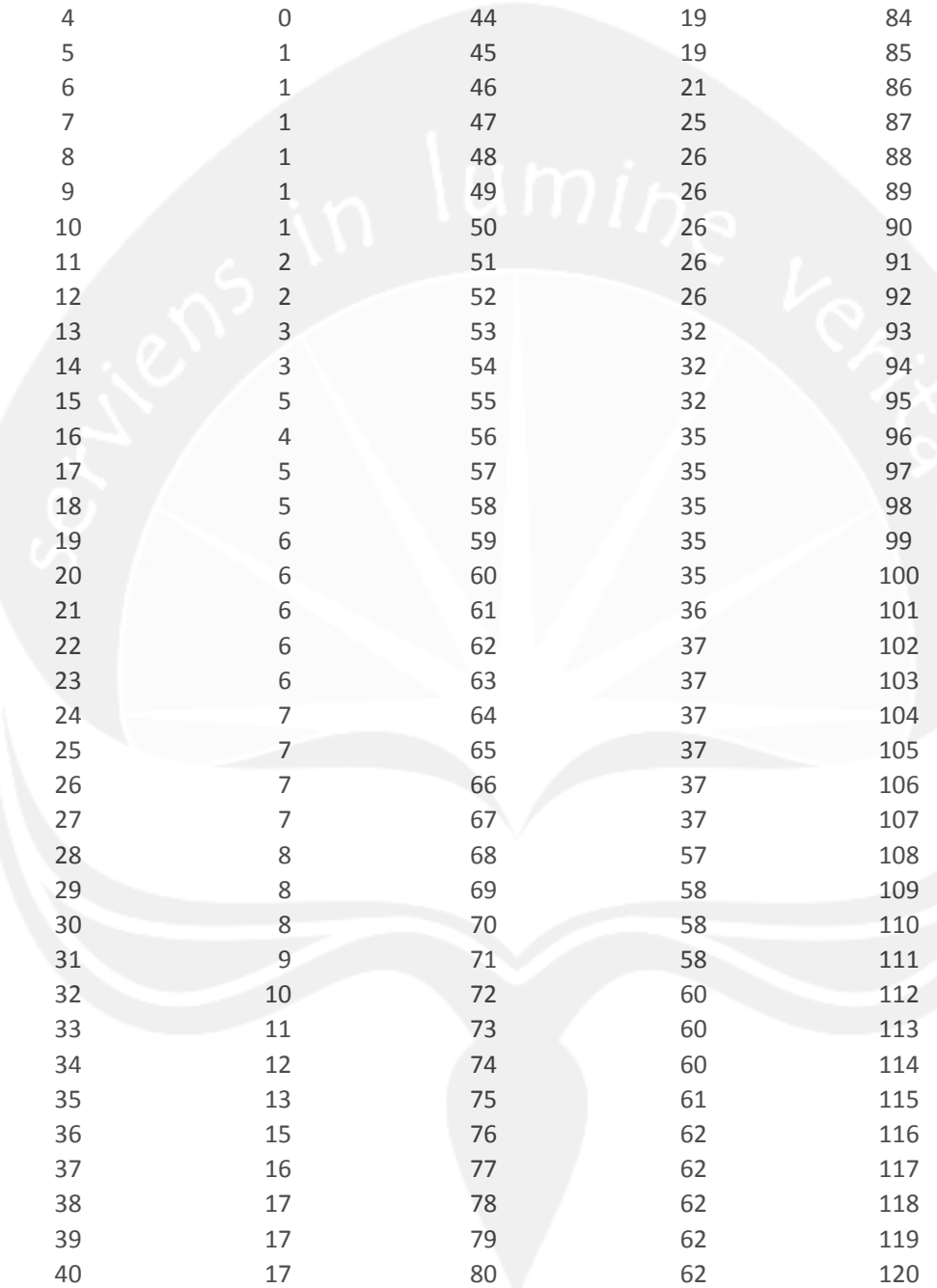
Sirip 3D



- ◆ Sirip 3D
  - Poly. (Sirip 3D)
- $5x^2 + 0,819x - 16,00$



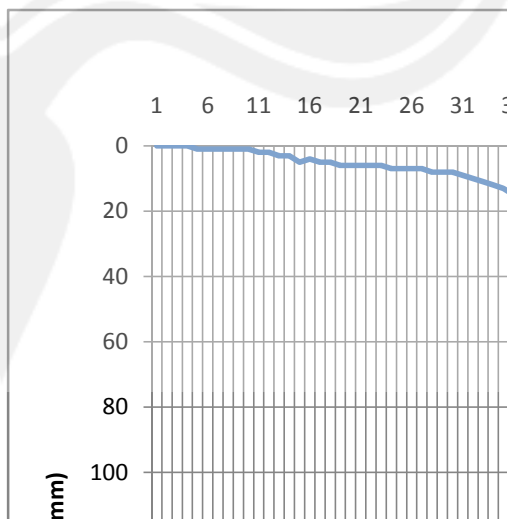


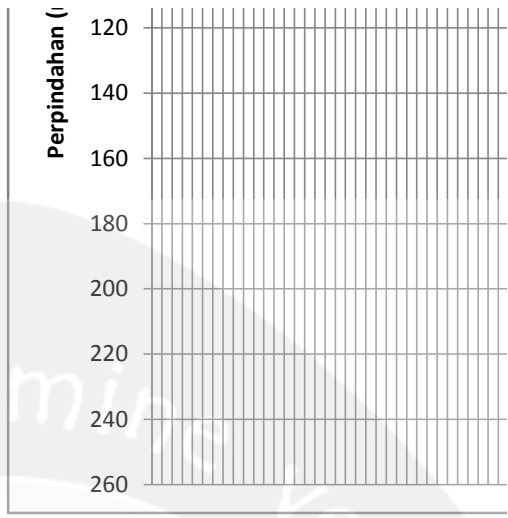
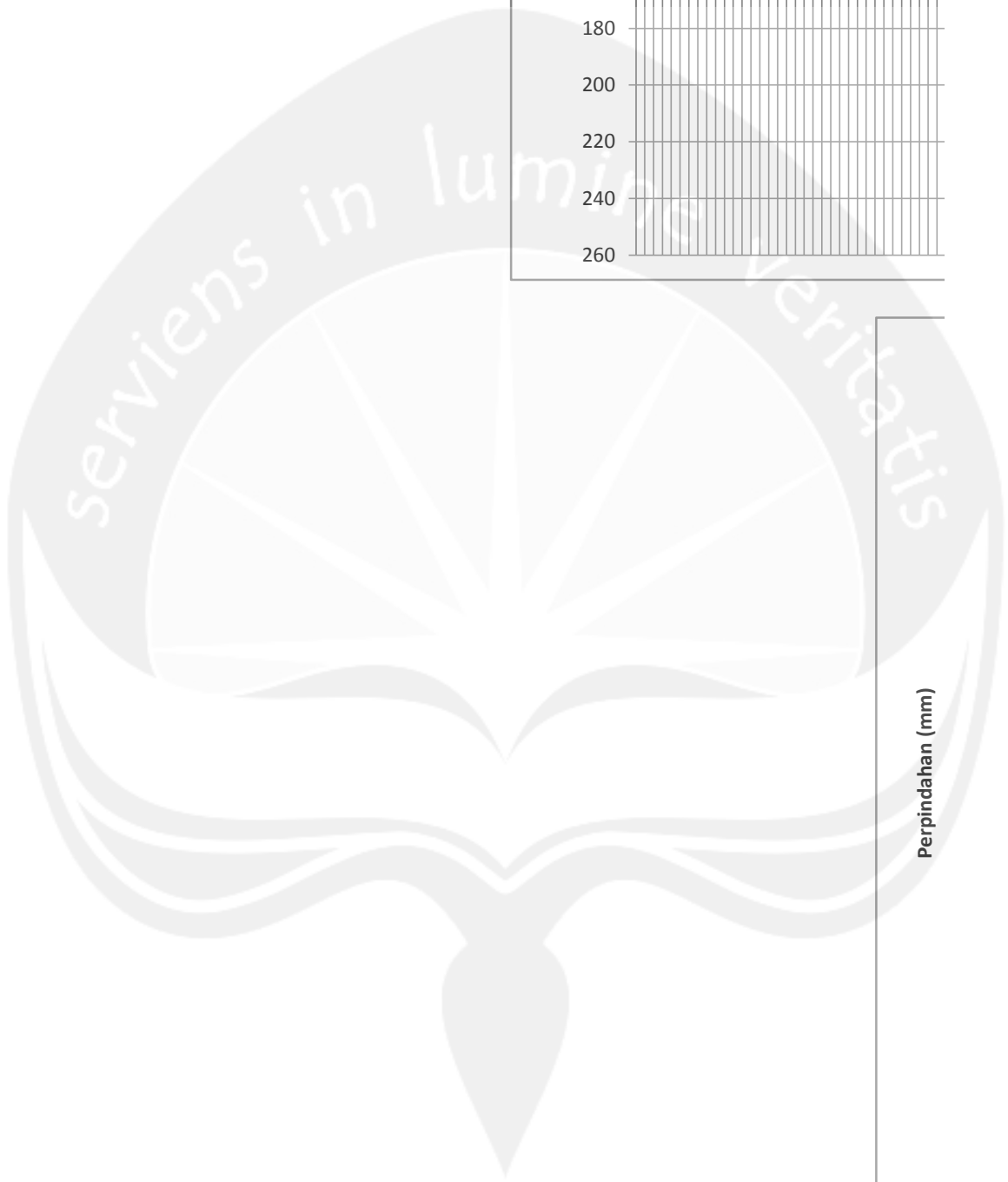


Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	41	17	81
2	0	42	19	82
3	0	43	19	83
4	0	44	19	84
5	1	45	19	85
6	1	46	21	86
7	1	47	25	87
8	1	48	26	88
9	1	49	26	89
10	1	50	26	90
11	2	51	26	91
12	2	52	26	92
13	3	53	32	93
14	3	54	32	94
15	5	55	32	95
16	4	56	35	96
17	5	57	35	97
18	5	58	35	98
19	6	59	35	99
20	6	60	35	100
21	6	61	36	101
22	6	62	37	102
23	6	63	37	103
24	7	64	37	104
25	7	65	37	105
26	7	66	37	106
27	7	67	37	107
28	8	68	57	108
29	8	69	58	109
30	8	70	58	110
31	9	71	58	111
32	10	72	60	112
33	11	73	60	113
34	12	74	60	114
35	13	75	61	115
36	15	76	62	116
37	16	77	62	117
38	17	78	62	118
39	17	79	62	119
40	17	80	62	120



Perpindahan	Beban	Perpindahan	Beban	Perpindahan
64	121	125	161	200
64	122	125	162	203
64	123	125	163	205
64	124	125	164	205
64	125	125	165	205
64	126	140	166	205
65	127	140	167	206
65	128	140	168	208
65	129	140	169	208
65	130	141	170	209
91	131	142	171	210
93	132	144	172	215
93	133	144	173	215
93	134	144	174	215
94	135	144	175	217
107	136	145	176	219
107	137	146	177	219
107	138	154	178	219
107	139	154	179	221
107	140	170	180	224
108	141	170	181	224
115	142	170	182	225
115	143	170	183	227
115	144	170	184	227
115	145	172	185	227
115	146	172	186	231
115	147	173	187	231
116	148	173	188	231
117	149	173		
117	150	174		
118	151	182		
118	152	183		
118	153	183		
118	154	183		
120	155	183		
120	156	186		
121	157	188		
122	158	190		
123	159	190		
124	160	191		





Beban = @ 1 Kg

Beban Total = Beban+berat bak-berat poer

**195,84**

Beban=188x1=188kg

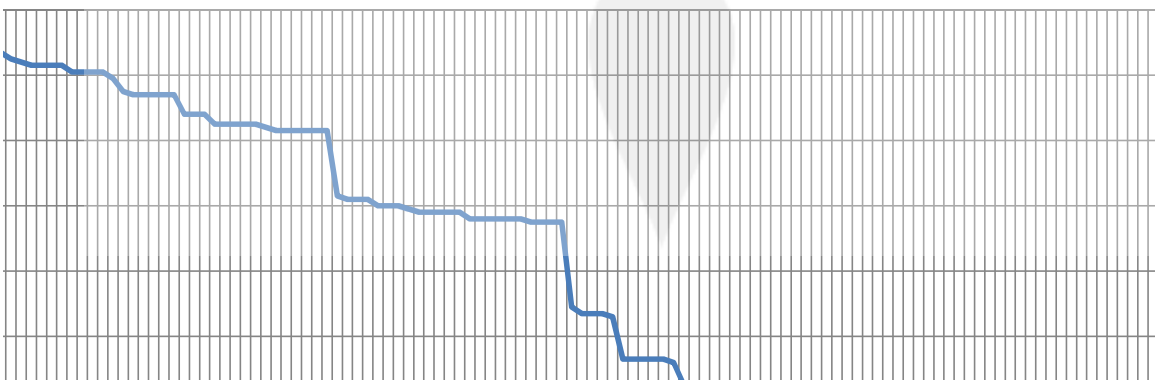
B.Bak=9.3kg

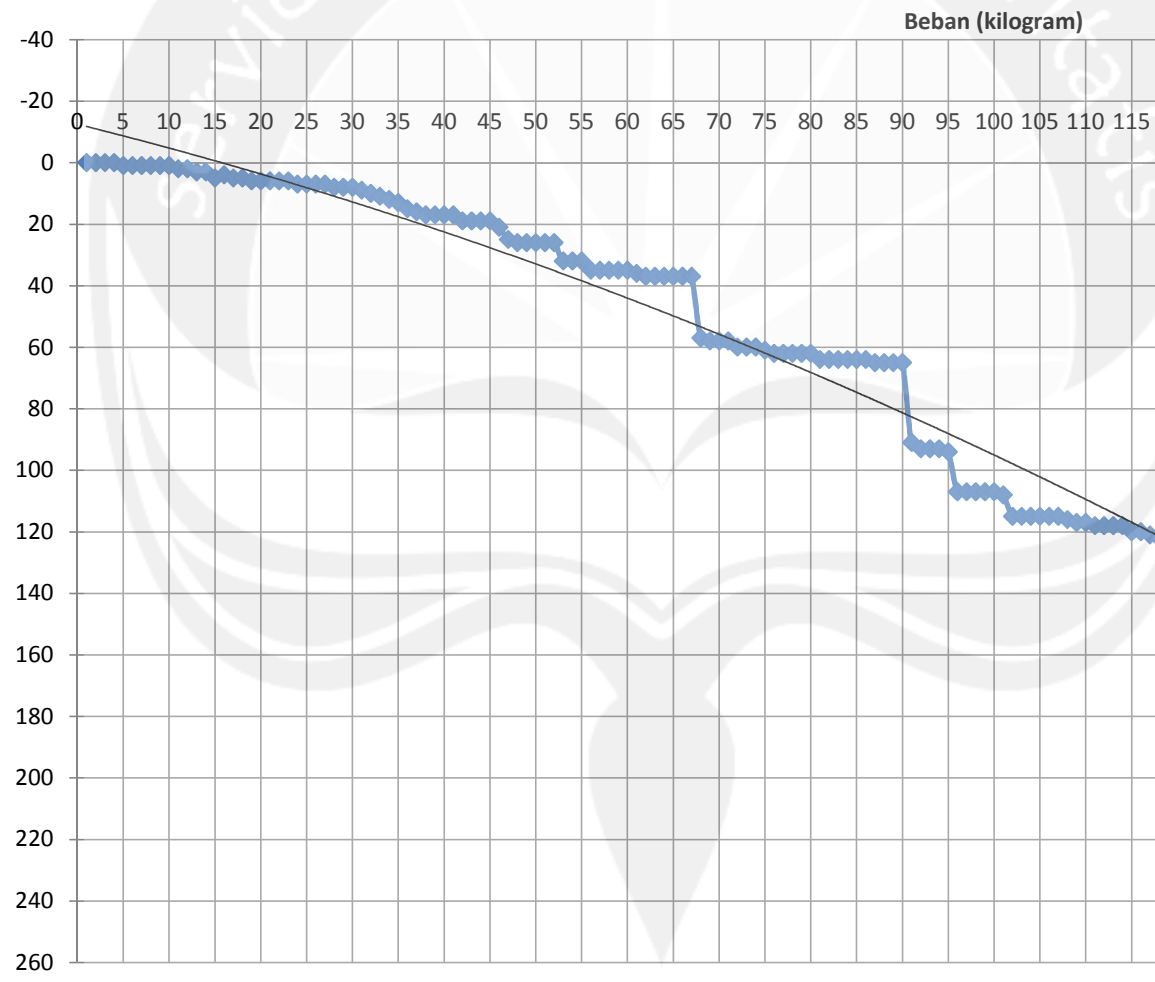
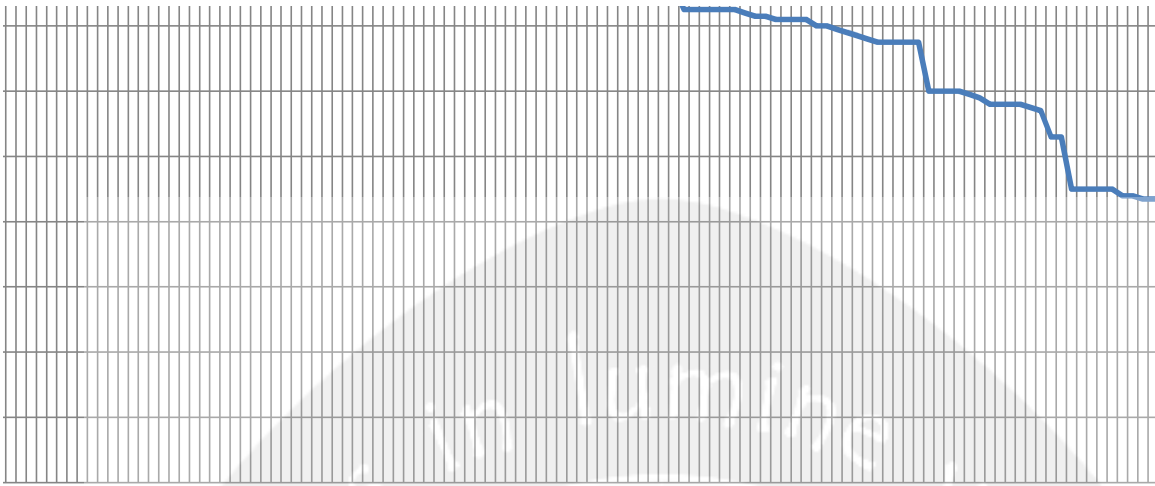
Berat poer=1465 gr



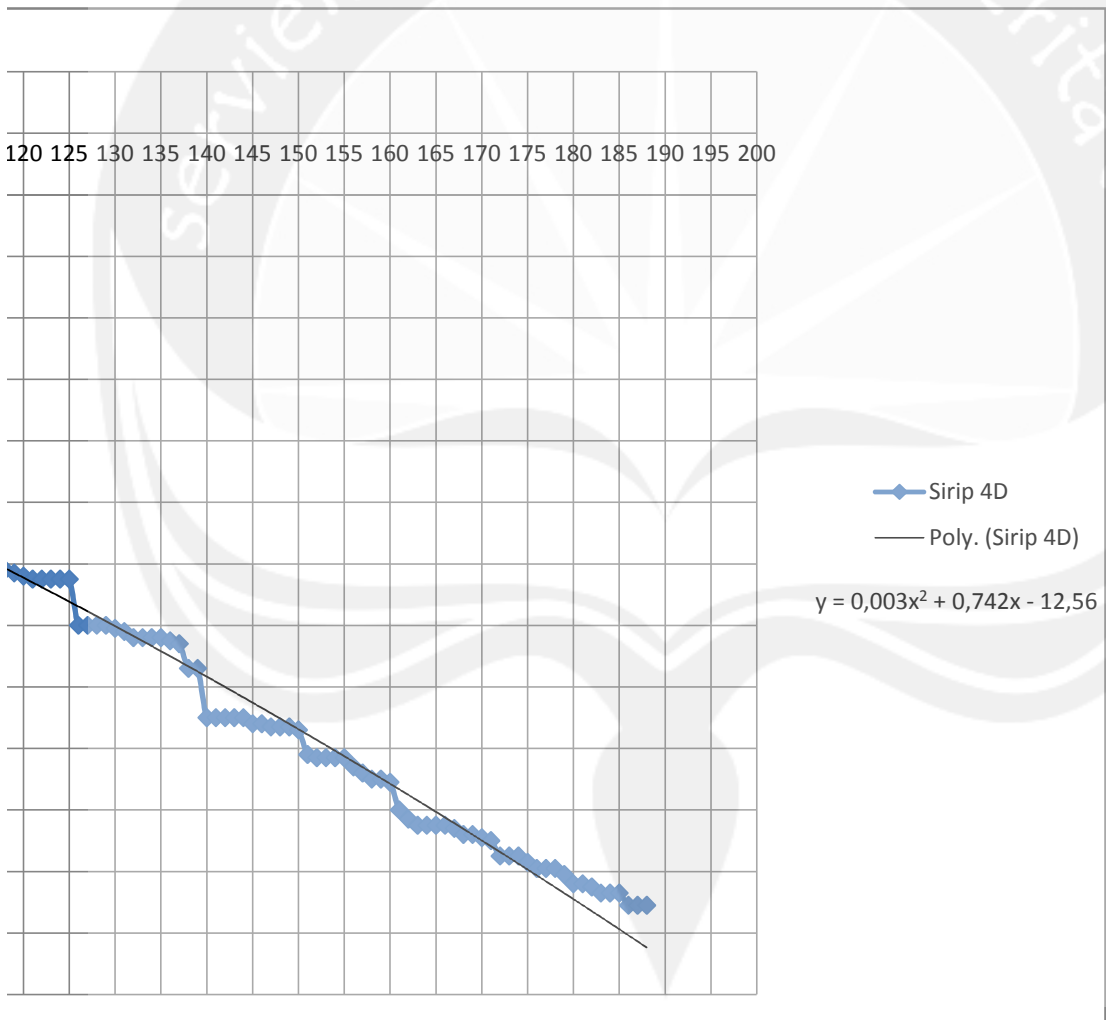
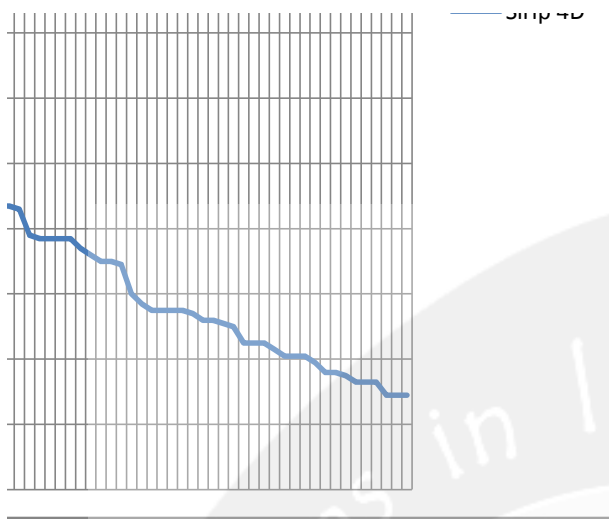
Beban (kilogram)

36 41 46 51 56 61 66 71 76 81 86 91 96 101 106 111 116 121 126 131 136 141 146

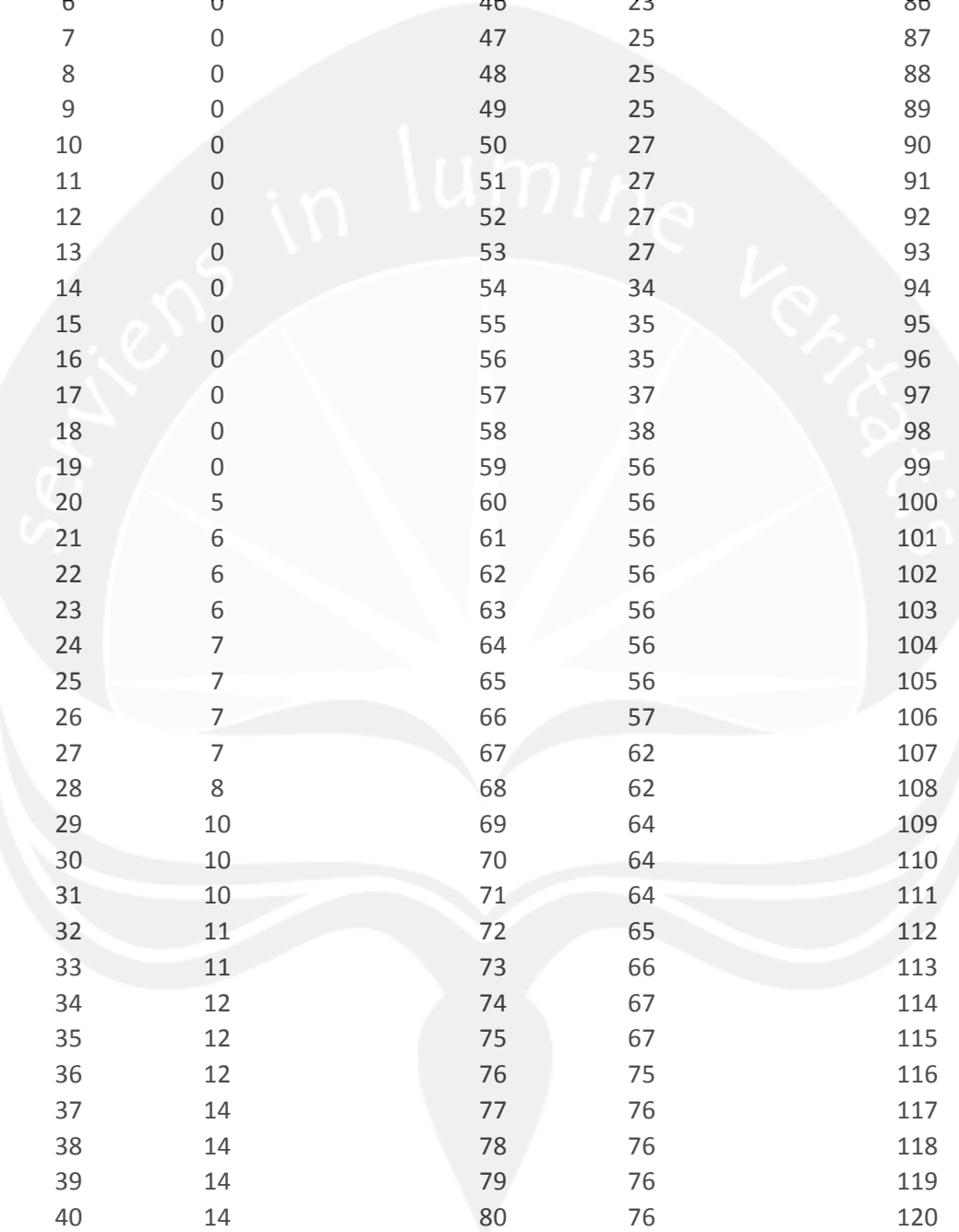




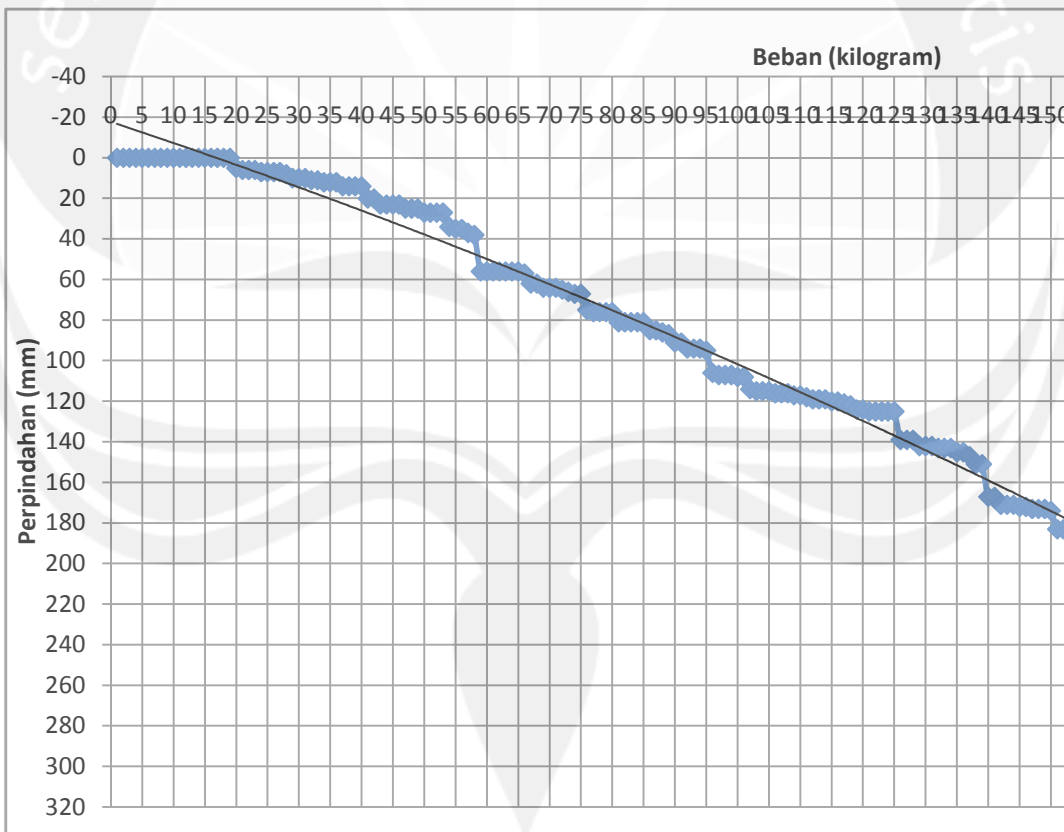
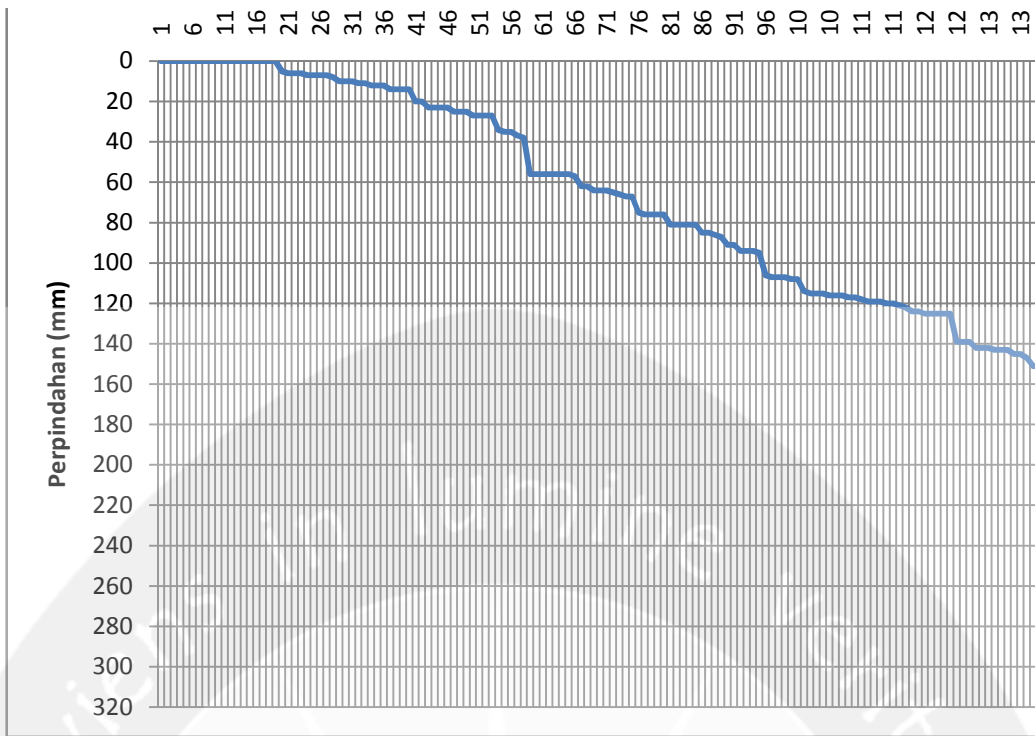






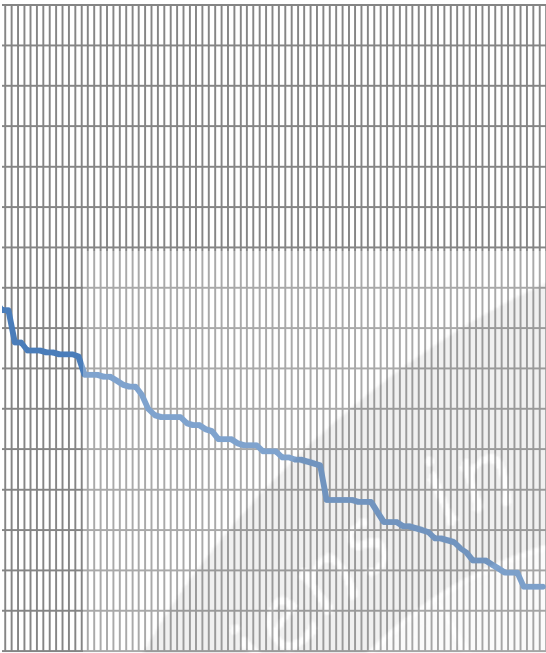


Beban	Perpindahan	Beban	Perpindahan	Beban
1	0	41	20	81
2	0	42	20	82
3	0	43	23	83
4	0	44	23	84
5	0	45	23	85
6	0	46	23	86
7	0	47	25	87
8	0	48	25	88
9	0	49	25	89
10	0	50	27	90
11	0	51	27	91
12	0	52	27	92
13	0	53	27	93
14	0	54	34	94
15	0	55	35	95
16	0	56	35	96
17	0	57	37	97
18	0	58	38	98
19	0	59	56	99
20	5	60	56	100
21	6	61	56	101
22	6	62	56	102
23	6	63	56	103
24	7	64	56	104
25	7	65	56	105
26	7	66	57	106
27	7	67	62	107
28	8	68	62	108
29	10	69	64	109
30	10	70	64	110
31	10	71	64	111
32	11	72	65	112
33	11	73	66	113
34	12	74	67	114
35	12	75	67	115
36	12	76	75	116
37	14	77	76	117
38	14	78	76	118
39	14	79	76	119
40	14	80	76	120



Perpindahan	Beban	Perpindahan	Beban	Perpindahan
81	121	125	161	200
81	122	125	162	203
81	123	125	163	204
81	124	125	164	204
81	125	125	165	204
85	126	139	166	204
85	127	139	167	207
86	128	139	168	208
87	129	142	169	208
91	130	142	170	210
91	131	142	171	211
94	132	143	172	215
94	133	143	173	215
94	134	143	174	215
95	135	145	175	217
106	136	145	176	218
107	137	147	177	218
107	138	151	178	218
107	139	151	179	221
108	140	167	180	221
108	141	167	181	221
114	142	171	182	224
115	143	171	183	224
115	144	171	184	225
115	145	172	185	225
116	146	172	186	226
116	147	173	187	227
116	148	173	188	228
117	149	173	189	245
117	150	174	190	245
118	151	183	191	245
119	152	183	192	245
119	153	183	193	245
119	154	184	194	246
120	155	184	195	246
120	156	186	196	246
121	157	188	197	251
122	158	189	198	256
124	159	189	199	256
124	160	193	200	256
			201	258
			202	258
			203	259
			204	260
			205	261
			206	264
			207	264

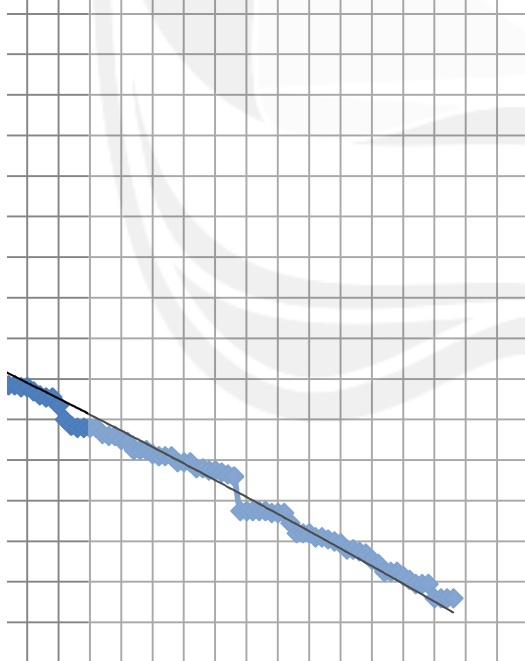
14 14 15 15 16 16 17 17 18 18 19 19 20 20 21 21 22



— Sirip 5D

209	266
210	269
211	271
212	275
213	275
214	275
215	277
216	279
217	281
218	281
219	281
220	288
221	288
222	288
223	288

155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235



—◆ Sirip 5D

— Poly. (Sirip 5D)

$$y = 0,001x^2 + 1,024x - 17,65$$

Beban = @ 1 Kg

Beban Total = Beban+berat bak-berat poer

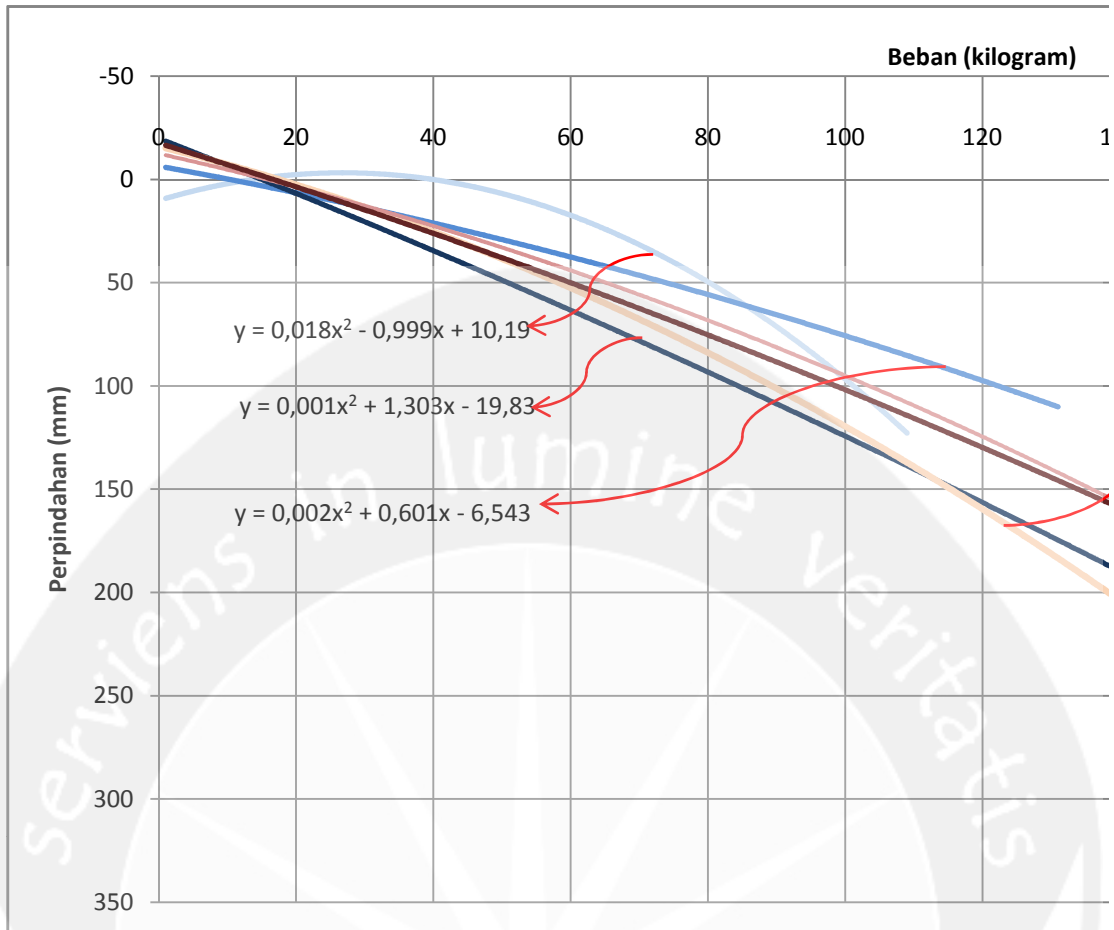
**230,84**

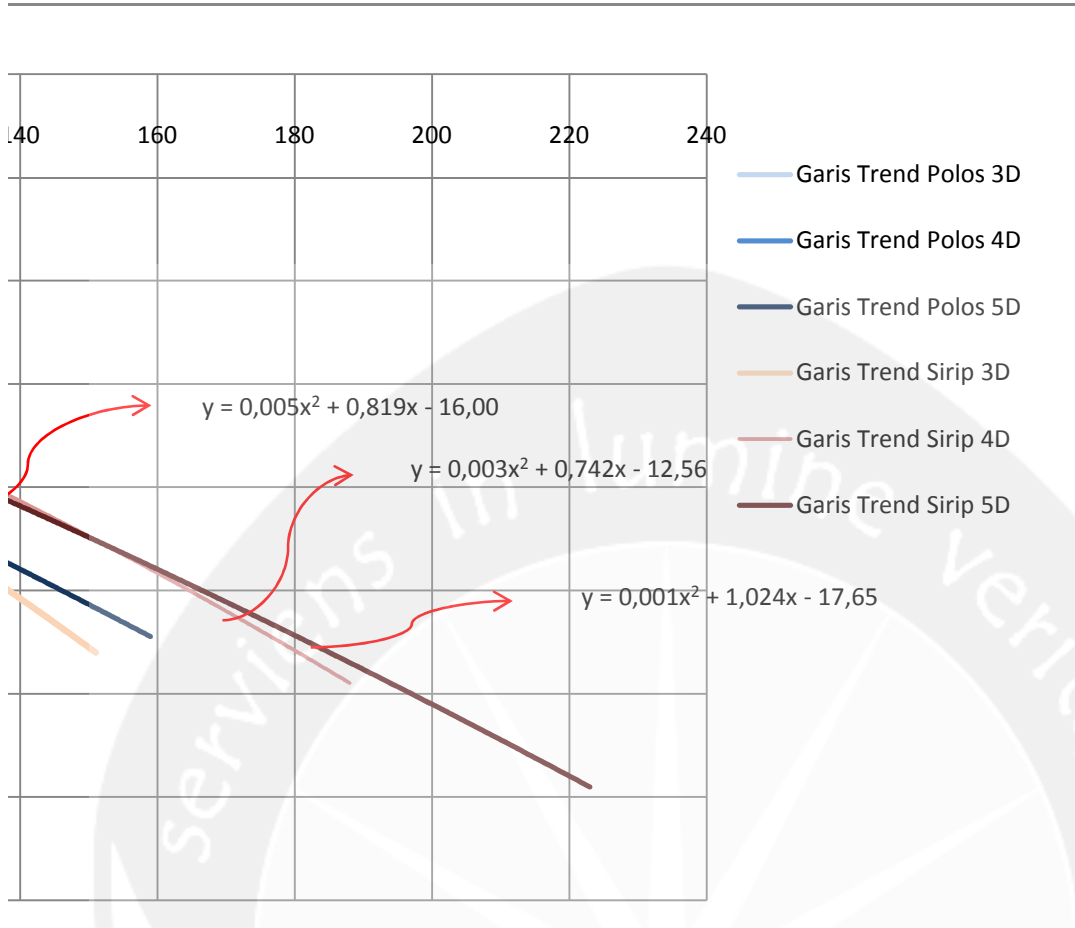
Beban=223x1=223kg

B.Bak=9.3kg

Berat poer=1465 gr



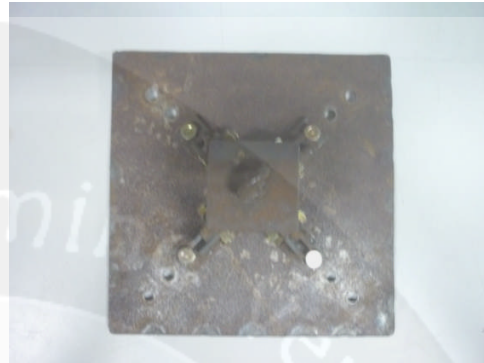




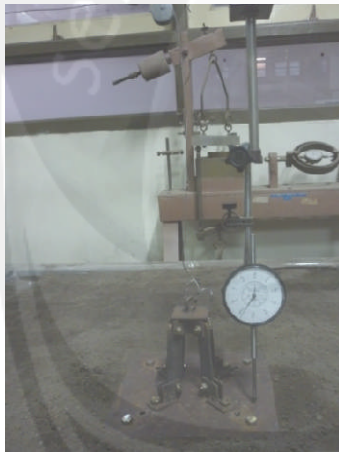
## Dokumentasi



Pasir hasil erupsi merapi



*Pile Cap* tiang kelompok



Instalasi alat pada kotak uji



Pemadatan tanah pasir di dalam kotak uji



