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LAMPIRAN

Lampiran 1 Pembuktian Incomplete Beta Function

Bukti dari

$$\int_0^p \frac{n!}{(k-1)!\,(n-k)!} z^{k-1}(1-z)^{n-k}dz = \sum_{w=k}^{n} \binom{n}{w} p^w (1-p)^{n-w}$$

Dimana $0 < p < 1$ dan k dan n bilangan bulat positif sedemikian sehingga $k \leq n$.

Dengan menurunkan kedua ruas terhadap p, maka diperoleh

$$\frac{n!}{(k-1)!\,(n-k)!} p^{k-1}(1-p)^{n-k} = \sum_{w=k}^{n} \binom{n}{w} \{wp^{w-1}(1-p)^{n-w} - (n-w)(1-p)^{n-w-1}(p^w)\}$$

Perhatikan ruas kanan,

$$\sum_{w=k}^{n} \binom{n}{w} \{wp^{w-1}(1-p)^{n-w} - (n-w)(1-p)^{n-w-1}(p^w)\}$$

$$= \sum_{w=k}^{n} \binom{n}{w} \{wp^{w-1}(1-p)^{n-w} - (n-w)p^w(1-p)^{n-w-1}\}$$

$$= \binom{n}{k} \{kp^{k-1}(1-p)^{n-k} - (n-k)p^k(1-p)^{n-k-1}\}$$

$$+ \binom{n}{k+1} \{(k+1)p^{(k+1)-1}(1-p)^{n-(k+1)} - \big(n-(k+1)\big)p^{(k+1)}(1-p)^{n-(k+1)-1}\}$$

$$+ \binom{n}{k+2} \{(k+2)p^{(k+2)-1}(1-p)^{n-(k+2)} - \big(n-(k+2)\big)p^{(k+2)}(1-p)^{n-(k+2)-1}\}$$

$$+ \cdots$$

$$+ \binom{n}{n-1} \{(n-1)p^{(n-1)-1}(1-p)^{n-(n-1)} - \big(n-(n-1)\big)p^{(n-1)}(1-p)^{n-(n-1)-1}\}$$

$$+ \binom{n}{n} \{np^{n-1}(1-p)^{n-n} - (n-n)p^n(1-p)^{n-n-1}\}$$

$$= \binom{n}{k}\{kp^{k-1}(1-p)^{n-k} - (n-k)p^k(1-p)^{n-k-1}\}$$

$$+ \binom{n}{k+1}\{(k+1)p^k(1-p)^{n-k-1} - (n-k-1)p^{k+1}(1-p)^{n-k-2}\}$$

$$+ \binom{n}{k+2}\{(k+2)p^{k+1}(1-p)^{n-k-2} - (n-k-2)p^{k+2}(1-p)^{n-k-3}\}$$

$$+ \cdots$$

$$+ \binom{n}{n-1}\{(n-1)p^{n-2}(1-p)^1 - (1)p^{n-1}(1-p)^0\}$$

$$+ \binom{n}{n}\{np^{n-1}(1-p)^0 - (0)p^n(1-p)^{-1}\}$$

$$= \binom{n}{k}kp^{k-1}(1-p)^{n-k}$$

$$+p^k(1-p)^{n-k-1}\left\{\binom{n}{k+1}(k+1) - \binom{n}{k}(n-k)\right\}$$

$$+p^{k+1}(1-p)^{n-k-2}\left\{\binom{n}{k+2}(k+2) - \binom{n}{k+1}(n-k-1)\right\}$$

$$+p^{k+2}(1-p)^{n-k-3}\left\{\binom{n}{k+3}(k+3) - \binom{n}{k+2}(n-k-2)\right\}$$

$$+ \cdots$$

$$+p^{n-2}(1-p)\left\{\binom{n}{n-1}(n-1) - \binom{n}{n-2}(2)\right\}$$

$$+p^{n-1}\left\{\binom{n}{n}(n) - \binom{n}{n-1}(1)\right\}$$

Bentuk $\left\{\binom{n}{c}(c) - \binom{n}{c-1}\big(n-(c-1)\big)\right\}, c = k+1, k+2, \ldots, n$ bernilai 0 karena $\left\{\binom{n}{c}(c) - \binom{n}{c-1}\big(n-(c-1)\big)\right\}$

$$= \left\{\frac{n!}{c!\,(n-c)!}(c) - \frac{n!}{(c-1)!\,\big(n-(c-1)\big)!}\big(n-(c-1)\big)\right\}$$

$$= \left\{\frac{n!}{(c-1)!\,(n-c)!} - \frac{n!}{(c-1)!\,(n-(c-1)-1)!}\right\}$$

$$= \left\{ \frac{n!}{(c-1)!\,(n-c)!} - \frac{n!}{(c-1)!\,(n-c)!} \right\} = 0$$

Sehingga diperoleh

$$\binom{n}{k} kp^{k-1}(1-p)^{n-k} = \frac{n!}{k!\,(n-k)!} kp^{k-1}(1-p)^{n-k}$$

$$= \frac{n!}{(k-1)!\,(n-k)!} p^{k-1}(1-p)^{n-k}$$

Jadi $\int_0^p \frac{n!}{(k-1)!(n-k)!} z^{k-1}(1-z)^{n-k}dz$ dan $\sum_{w=k}^{n} \binom{n}{w} p^w(1-p)^{n-w}$ memiliki turunan fungsi yang sama.

Selanjutnya misalkan $f(p) = \int_0^p \frac{n!}{(k-1)!(n-k)!} z^{k-1}(1-z)^{n-k}dz$ dan $g(p) = \sum_{w=k}^{n} \binom{n}{w} p^w(1-p)^{n-w}$, keduanya fungsi yang kontinu pada [0,1]. Berdasarkan teorema fundamental kalkulus, misalkan $p \in [0,1]$

$$\int_0^p f'(t)dt = f(p) - f(0)$$

$$\int_0^p g'(t)dt = g(p) - g(0)$$

Diketahui sebelumnya bahwa $f'(p) = g'(p)$ dan

$$f(0) = \int_0^0 \frac{n!}{(k-1)!\,(n-k)!} z^{k-1}(1-z)^{n-k}dz = 0$$

$$g(0) = \sum_{w=k}^{n} \binom{n}{w} (0)^w(1)^{n-w} = 0$$

sehingga diperoleh

$$\int_0^p f'(t)dt = \int_0^p g'(t)dt$$

$$f(p) - f(0) = g(p) - g(0)$$

$$f(p) = g(p)$$

Yaitu $\int_0^p \frac{n!}{(k-1)!(n-k)!} z^{k-1}(1-z)^{n-k}dz = \sum_{w=k}^{n} \binom{n}{w} p^w(1-p)^{n-w}$ ■

Lampiran 2 Estimasi Selang Kepercayaan Clopper-Pearson menggunakan Tail Function dengan nilai nominal 95%

1. $\delta = 0.01$ dan $\lambda = 0.1$

Y	ℓ	u
0	0	0.007109769
1	0.000078118	0.012333001
2	0.000602791	0.015580361
3	0.00143615	0.018579781
4	0.002442192	0.021423998
5	0.003559466	0.024158914
6	0.004755523	0.026811292
7	0.006010952	0.029398388
8	0.0073131	0.031932117
9	0.008653186	0.034421131
10	0.010024828	0.036871955
11	0.011423213	0.039289662
12	0.01284461	0.041678291
13	0.014286053	0.044041126
14	0.015745138	0.046380879
15	0.017219887	0.048699828
16	0.018708644	0.050999902
17	0.020210009	0.053282763
18	0.021722785	0.055549845
19	0.023245938	0.057802406
20	0.024778568	0.060041552
21	0.026319884	0.062268262
22	0.027869187	0.064483411
23	0.029425858	0.066687785
24	0.030989341	0.068882089
25	0.032559137	0.071066964
26	0.034134796	0.073242993
27	0.035715908	0.075410706
28	0.037302104	0.077570591
29	0.038893041	0.079723096
30	0.040488409	0.081868632
31	0.042087922	0.084007582
32	0.043691314	0.0861403
33	0.045298341	0.088267113
34	0.046908776	0.090388328
35	0.048522408	0.092504231
36	0.050139041	0.094615089
37	0.051758491	0.096721152
38	0.053380587	0.098822655
39	0.055005167	0.100919818

Y	ℓ	u
40	0.05663208	0.10301285
41	0.058261185	0.105101946
42	0.059892348	0.107187292
43	0.061525442	0.109269062
44	0.063160349	0.11134742
45	0.064796956	0.113422525
46	0.066435156	0.115494523
47	0.068074848	0.117563556
48	0.069715937	0.119629758
49	0.071358332	0.121693254
50	0.073001947	0.123754167
51	0.074646698	0.12581261
52	0.076292509	0.127868694
53	0.077939305	0.129922521
54	0.079587014	0.131974193
55	0.08123557	0.134023801
56	0.082884908	0.136071438
57	0.084534966	0.13811719
58	0.086185686	0.140161137
59	0.087837011	0.142203358
60	0.089488889	0.144243928
61	0.091141268	0.146282919
62	0.092794098	0.148320398
63	0.094447334	0.15035643
64	0.096100931	0.152391077
65	0.097754846	0.154424398
66	0.099409038	0.156456449
67	0.101063469	0.158487285
68	0.1027181	0.160516957
69	0.104372897	0.162545512
70	0.106027825	0.164572999
71	0.107682851	0.166599461
72	0.109337946	0.168624941
73	0.110993079	0.170649478
74	0.112648221	0.172673111
75	0.114303347	0.174695877
76	0.115958429	0.176717809
77	0.117613444	0.17873894
78	0.119268369	0.180759302
79	0.120923181	0.182778924

Y	ℓ	u
80	0.122577859	0.184797833
81	0.124232383	0.186816056
82	0.125886735	0.188833617
83	0.127540896	0.190850541
84	0.129194849	0.192866849
85	0.130848579	0.194882561
86	0.13250207	0.196897698
87	0.134155308	0.198912277
88	0.13580828	0.200926315
89	0.137460974	0.202939829
90	0.139113377	0.204952832
91	0.14076548	0.20696534
92	0.142417271	0.208977364
93	0.144068743	0.210988916
94	0.145719886	0.213000007
95	0.147370693	0.215010647
96	0.149021156	0.217020844
97	0.150671271	0.219030608
98	0.15232103	0.221039946
99	0.15397043	0.223048863
100	0.155619466	0.225057367
101	0.157268135	0.227065461
102	0.158916433	0.229073151
103	0.16056436	0.231080441
104	0.162211912	0.233087333
105	0.163859091	0.235093831
106	0.165505894	0.237099937
107	0.167152323	0.239105651
108	0.16879838	0.241110976
109	0.170444064	0.243115912
110	0.17208938	0.245120458
111	0.173734329	0.247124616
112	0.175378915	0.249128384
113	0.177023143	0.251131761
114	0.178667017	0.253134746
115	0.180310542	0.255137337
116	0.181953725	0.257139532
117	0.183596572	0.259141329
118	0.18523909	0.261142726
119	0.186881287	0.263143719
120	0.188523172	0.265144307
121	0.190164753	0.267144484
122	0.19180604	0.269144249
123	0.193447044	0.271143598

Y	ℓ	u
125	0.196728246	0.275141033
126	0.198368467	0.27713911
127	0.200008453	0.279136756
128	0.201648217	0.281133967
129	0.203287773	0.283130738
130	0.204927135	0.285127065
131	0.206566321	0.287122943
132	0.208205345	0.28911837
133	0.209844225	0.291113339
134	0.211482979	0.293107848
135	0.213121625	0.295101892
136	0.214760183	0.297095466
137	0.216398673	0.299088566
138	0.218037115	0.301081188
139	0.219675532	0.303073328
140	0.221313945	0.305064982
141	0.222952378	0.307056146
142	0.224590855	0.309046815
143	0.226229402	0.311036987
144	0.227868044	0.313026656
145	0.229506808	0.31501582
146	0.231145722	0.317004474
147	0.232784814	0.318992615
148	0.234424115	0.32098024
149	0.236063655	0.322967345
150	0.237703465	0.324953926
151	0.239343579	0.326939981
152	0.240984031	0.328925507
153	0.242624854	0.3309105
154	0.244266085	0.332894958
155	0.245907762	0.334878878
156	0.247549922	0.336862257
157	0.249192604	0.338845093
158	0.25083585	0.340827383
159	0.2524797	0.342809125
160	0.254124198	0.344790317
161	0.255769387	0.346770956
162	0.257415313	0.348751042
163	0.259062023	0.350730571
164	0.260709565	0.352709542
165	0.262357986	0.354687953
166	0.264007338	0.356665803
167	0.265657672	0.358643091
168	0.26730904	0.360619815

124	0.195087775	0.273142527
Y	ℓ	u
170	0.270615099	0.364571565
171	0.272269901	0.36654659
172	0.273925961	0.368521046
173	0.275583338	0.370494932
174	0.277242091	0.372468249
175	0.278902283	0.374440995
176	0.280563976	0.37641317
177	0.282227231	0.378384772
178	0.283892115	0.380355802
179	0.285558691	0.38232626
180	0.287227026	0.384296144
181	0.288897188	0.386265454
182	0.290569242	0.388234192
183	0.292243258	0.390202355
184	0.293919304	0.392169945
185	0.29559745	0.394136961
186	0.297277764	0.396103403
187	0.298960317	0.398069272
188	0.300645178	0.400034567
189	0.302332417	0.40199929
190	0.304022103	0.403963439
191	0.305714305	0.405927016
192	0.307409092	0.40789002
193	0.309106532	0.409852452
194	0.310806691	0.411814313
195	0.312509636	0.413775603
196	0.314215431	0.415736322
197	0.31592414	0.417696471
198	0.317635824	0.41965605
199	0.319350542	0.421615061
200	0.321068354	0.423573503
201	0.322789314	0.425531377
202	0.324513476	0.427488684
203	0.32624089	0.429445424
204	0.327971604	0.431401599
205	0.329705664	0.433357208
206	0.331443111	0.435312252
207	0.333183984	0.437266733
208	0.334928318	0.43922065
209	0.336676145	0.441174005
210	0.338427492	0.443126798
211	0.340182383	0.445079029
212	0.34194084	0.4470307
213	0.343702879	0.448981812

169	0.268961498	0.362595973
Y	ℓ	u
215	0.347237745	0.452882358
216	0.349010585	0.454831794
217	0.350787032	0.456780674
218	0.352567081	0.458728997
219	0.354350725	0.460676764
220	0.356137952	0.462623976
221	0.357928747	0.464570635
222	0.359723089	0.466516739
223	0.361520956	0.468462291
224	0.363322322	0.47040729
225	0.365127157	0.472351737
226	0.366935427	0.474295634
227	0.368747097	0.47623898
228	0.370562127	0.478181776
229	0.372380478	0.480124023
230	0.374202104	0.482065721
231	0.37602696	0.48400687
232	0.377854997	0.485947472
233	0.379686167	0.487887527
234	0.381520418	0.489827035
235	0.383357696	0.491765997
236	0.38519795	0.493704413
237	0.387041123	0.495642284
238	0.388887161	0.49757961
239	0.390736008	0.499516392
240	0.392587608	0.501452629
241	0.394441905	0.503388323
242	0.396298842	0.505323473
243	0.398158363	0.50725808
244	0.400020413	0.509192145
245	0.401884937	0.511125667
246	0.403751881	0.513058647
247	0.40562119	0.514991085
248	0.407492812	0.516922982
249	0.409366695	0.518854337
250	0.411242788	0.52078515
251	0.413121042	0.522715423
252	0.415001408	0.524645154
253	0.416883839	0.526574345
254	0.418768288	0.528502995
255	0.420654712	0.530431105
256	0.422543068	0.532358673
257	0.424433313	0.534285702
258	0.426325407	0.536212189

214	0.345468511	0.450932364
Y	ℓ	u
260	0.430114988	0.540063543
261	0.432012402	0.541988408
262	0.433911518	0.543912733
263	0.435812302	0.545836518
264	0.437714724	0.547759761
265	0.439618753	0.549682463
266	0.441524359	0.551604624
267	0.443431514	0.553526243
268	0.445340194	0.555447321
269	0.447250371	0.557367857
270	0.449162023	0.55928785
271	0.451075126	0.561207302
272	0.452989659	0.56312621
273	0.454905602	0.565044575
274	0.456822935	0.566962397
275	0.45874164	0.568879675
276	0.460661699	0.570796408
277	0.462583098	0.572712597
278	0.464505819	0.574628241
279	0.466429849	0.576543339
280	0.468355175	0.578457891
281	0.470281783	0.580371896
282	0.472209662	0.582285354
283	0.474138802	0.584198264
284	0.47606919	0.586110626
285	0.478000819	0.588022438
286	0.479933678	0.589933701
287	0.481867761	0.591844413
288	0.483803058	0.593754575
289	0.485739564	0.595664184
290	0.487677271	0.597573241
291	0.489616174	0.599481744
292	0.491556267	0.601389693
293	0.493497546	0.603297087
294	0.495440005	0.605203924
295	0.497383641	0.607110205
296	0.499328451	0.609015929
297	0.50127443	0.610921093
298	0.503221577	0.612825698
299	0.505169889	0.614729741
300	0.507119363	0.616633223
301	0.509069999	0.618536142
302	0.511021793	0.620438497
303	0.512974746	0.622340287

259	0.428219311	0.538138136
Y	ℓ	u
305	0.516884125	0.626142167
306	0.518840549	0.628042254
307	0.520798129	0.629941772
308	0.522756866	0.631840718
309	0.52471676	0.633739092
310	0.526677812	0.635636891
311	0.528640022	0.637534116
312	0.530603392	0.639430763
313	0.532567922	0.641326833
314	0.534533614	0.643222323
315	0.53650047	0.645117231
316	0.538468491	0.647011557
317	0.540437678	0.648905299
318	0.542408035	0.650798455
319	0.544379564	0.652691023
320	0.546352266	0.654583002
321	0.548326144	0.65647439
322	0.550301201	0.658365185
323	0.552277439	0.660255386
324	0.554254861	0.662144991
325	0.556233471	0.664033997
326	0.558213272	0.665922403
327	0.560194266	0.667810207
328	0.562176457	0.669697407
329	0.564159848	0.671584001
330	0.566144444	0.673469987
331	0.568130248	0.675355362
332	0.570117263	0.677240125
333	0.572105494	0.679124273
334	0.574094945	0.681007805
335	0.576085619	0.682890717
336	0.578077522	0.684773008
337	0.580070657	0.686654674
338	0.582065029	0.688535715
339	0.584060642	0.690416127
340	0.586057502	0.692295907
341	0.588055613	0.694175054
342	0.590054979	0.696053564
343	0.592055607	0.697931435
344	0.594057501	0.699808665
345	0.596060666	0.701685249
346	0.598065108	0.703561187
347	0.600070832	0.705436474
348	0.602077843	0.707311107

304	0.514928857	0.624241511
Y	ℓ	u
350	0.606095753	0.711058403
351	0.608106663	0.712931059
352	0.610118884	0.71480305
353	0.612132423	0.716674372
354	0.614147285	0.718545021
355	0.616163477	0.720414996
356	0.618181006	0.722284292
357	0.620199879	0.724152905
358	0.622220102	0.726020833
359	0.624241681	0.727888072
360	0.626264625	0.729754618
361	0.628288941	0.731620467
362	0.630314635	0.733485615
363	0.632341715	0.735350059
364	0.634370189	0.737213795
365	0.636400065	0.739076819
366	0.63843135	0.740939126
367	0.640464053	0.742800712
368	0.642498182	0.744661573
369	0.644533745	0.746521705
370	0.646570751	0.748381104
371	0.648609209	0.750239764
372	0.650649126	0.752097682
373	0.652690514	0.753954852
374	0.65473338	0.75581127
375	0.656777734	0.75766693
376	0.658823587	0.759521829
377	0.660870946	0.76137596
378	0.662919824	0.763229319
379	0.664970229	0.7650819
380	0.667022172	0.766933699
381	0.669075664	0.768784708
382	0.671130716	0.770634924
383	0.673187338	0.77248434
384	0.675245542	0.77433295
385	0.67730534	0.776180749
386	0.679366742	0.77802773
387	0.681429762	0.779873887
388	0.683494411	0.781719214
389	0.685560701	0.783563705
390	0.687628646	0.785407352
391	0.689698258	0.787250149
392	0.691769551	0.78909209
393	0.693842538	0.790933167

349	0.604086149	0.709185085
Y	ℓ	u
395	0.69799365	0.7946127
396	0.700071803	0.796451142
397	0.702151708	0.79828869
398	0.704233378	0.800125338
399	0.706316831	0.801961076
400	0.70840208	0.803795897
401	0.710489143	0.805629792
402	0.712578036	0.807462753
403	0.714668776	0.809294771
404	0.716761379	0.811125838
405	0.718855863	0.812955943
406	0.720952246	0.814785079
407	0.723050547	0.816613234
408	0.725150785	0.8184404
409	0.727252978	0.820266567
410	0.729357146	0.822091724
411	0.73146331	0.82391586
412	0.733571489	0.825738966
413	0.735681706	0.827561029
414	0.737793982	0.82938204
415	0.739908338	0.831201985
416	0.742024799	0.833020854
417	0.744143386	0.834838635
418	0.746264124	0.836655313
419	0.748387038	0.838470879
420	0.750512152	0.840285316
421	0.752639492	0.842098614
422	0.754769085	0.843910757
423	0.756900958	0.845721732
424	0.759035138	0.847531524
425	0.761171655	0.849340117
426	0.763310537	0.851147498
427	0.765451815	0.85295365
428	0.767595519	0.854758556
429	0.769741683	0.8565622
430	0.771890337	0.858364566
431	0.774041517	0.860165634
432	0.776195257	0.861965388
433	0.778351592	0.863763808
434	0.780510559	0.865560875
435	0.782672196	0.86735657
436	0.784836543	0.869150872
437	0.787003638	0.870943759
438	0.789173524	0.87273521

394	0.695917233	0.792773373
Y	ℓ	u
440	0.793521841	0.876313715
441	0.79570036	0.878100721
442	0.79788185	0.879886197
443	0.800066357	0.881670118
444	0.802253933	0.883452456
445	0.804444629	0.885233185
446	0.806638498	0.887012277
447	0.808835596	0.888789702
448	0.811035981	0.89056543
449	0.813239711	0.89233943
450	0.815446848	0.894111669
451	0.817657455	0.895882114
452	0.8198716	0.897650729
453	0.82208935	0.899417478
454	0.824310777	0.901182324
455	0.826535955	0.902945226
456	0.82876496	0.904706146
457	0.830997873	0.906465039
458	0.833234776	0.908221862
459	0.835475757	0.909976568
460	0.837720905	0.91172911
461	0.839970315	0.913479437
462	0.842224086	0.915227497
463	0.844482319	0.916973235
464	0.846745122	0.918716593
465	0.849012607	0.920457512
466	0.851284892	0.922195929
467	0.8535621	0.923931777
468	0.85584436	0.925664988
469	0.858131806	0.927395488
470	0.860424582	0.929123201
471	0.862722837	0.930848046
472	0.865026729	0.932569939
473	0.867336423	0.934288789
474	0.869652095	0.936004501
475	0.87197393	0.937716976
476	0.874302124	0.939426107
477	0.876636885	0.94113178
478	0.878978431	0.942833877
479	0.881326997	0.944532268
480	0.883682832	0.94622682
481	0.8860462	0.947917385
482	0.888417384	0.94960381
483	0.890796686	0.951285927

439	0.791346244	0.874525203
Y	ℓ	u
485	0.895580962	0.954636511
486	0.897986657	0.956304577
487	0.900401918	0.957967534
488	0.902827179	0.959625137
489	0.905262913	0.961277124
490	0.90770963	0.962923205
491	0.91016789	0.964563067
492	0.9126383	0.966196364
493	0.91512153	0.967822717
494	0.917618314	0.969441705
495	0.920129464	0.971052862
496	0.92265588	0.972655668
497	0.925198565	0.97424954
498	0.927758644	0.975833823
499	0.930337379	0.977407771
500	0.932936204	0.978970535
501	0.935556752	0.980521139
502	0.9382009	0.982058447
503	0.940870819	0.983581136
504	0.943569053	0.985087634
505	0.946298602	0.986576062
506	0.94906306	0.988044135
507	0.951866785	0.989489033
508	0.954715153	0.990907199
509	0.957614928	0.992294047
510	0.960574826	0.993643485
511	0.963606412	0.994947123
512	0.96672562	0.996192838
513	0.969955496	0.997361976
514	0.973331697	0.998423151
515	0.976915087	0.999316109
516	0.980827611	0.999901809
517	0.992890231	1

484	0.893184429	0.952963558

2. $\delta = 0$ dan $\lambda = 0.1$

Y	ℓ	u
0	0	0.007123498
1	0.000078870	0.012402744
2	0.000606469	0.01565678
3	0.001443262	0.018661634
4	0.002452849	0.021510501
5	0.003573694	0.024249522
6	0.004773317	0.026905602
7	0.006032299	0.029496091
8	0.007337979	0.032032971
9	0.008681574	0.034524941
10	0.0100567	0.036978564
11	0.011458544	0.039398939
12	0.012883373	0.04179013
13	0.01432822	0.044155438
14	0.015790683	0.046497591
15	0.01726878	0.048818878
16	0.018760858	0.051121241
17	0.020265516	0.053406348
18	0.021781555	0.055675643
19	0.023307943	0.057930389
20	0.024843777	0.060171697
21	0.026388268	0.062400552
22	0.027940716	0.064617834
23	0.029500501	0.066824331
24	0.031067066	0.069020751
25	0.032639913	0.07120774
26	0.034218591	0.073385881
27	0.035802691	0.075555709
28	0.037391841	0.077717711
29	0.038985699	0.079872338
30	0.040583955	0.082020004
31	0.042186321	0.084161092
32	0.043792532	0.086295956
33	0.045402343	0.088424926
34	0.047015526	0.09054831
35	0.04863187	0.092666394
36	0.050251177	0.094779447
37	0.051873265	0.096887718
38	0.05349796	0.098991443
39	0.055125101	0.101090845
40	0.056754537	0.10318613
41	0.058386124	0.105277496
42	0.060019729	0.107365128

Y	ℓ	u
43	0.061655224	0.1094492
44	0.06329249	0.111529879
45	0.064931413	0.113607321
46	0.066571886	0.115681675
47	0.068213809	0.117753081
48	0.069857083	0.119821674
49	0.071501617	0.121887581
50	0.073147325	0.123950922
51	0.074794123	0.126011812
52	0.076441932	0.128070361
53	0.078090677	0.130126673
54	0.079740287	0.132180847
55	0.081390692	0.134232978
56	0.083041828	0.136283156
57	0.084693631	0.138331467
58	0.086346043	0.140377993
59	0.087999006	0.142422812
60	0.089652465	0.144465999
61	0.091306369	0.146507625
62	0.092960667	0.148547758
63	0.094615311	0.150586463
64	0.096270256	0.152623801
65	0.097925457	0.154659833
66	0.099580873	0.156694613
67	0.101236462	0.158728196
68	0.102892188	0.160760632
69	0.104548011	0.162791971
70	0.106203898	0.16482226
71	0.107859814	0.166851541
72	0.109515725	0.168879858
73	0.111171602	0.17090725
74	0.112827414	0.172933755
75	0.114483132	0.174959409
76	0.116138729	0.176984248
77	0.117794178	0.179008303
78	0.119449455	0.181031604
79	0.121104534	0.183054183
80	0.122759394	0.185076065
81	0.124414011	0.187097277
82	0.126068365	0.189117843
83	0.127722435	0.191137788
84	0.129376203	0.193157132
85	0.131029649	0.195175895

Y	ℓ	u
86	0.132682756	0.197194098
87	0.134335507	0.199211759
88	0.135987886	0.201228893
89	0.137639878	0.203245517
90	0.139291469	0.205261645
91	0.140942643	0.20727729
92	0.142593389	0.209292466
93	0.144243694	0.211307183
94	0.145893546	0.213321453
95	0.147542933	0.215335284
96	0.149191845	0.217348685
97	0.150840273	0.219361665
98	0.152488206	0.221374231
99	0.154135636	0.223386388
100	0.155782554	0.225398143
101	0.157428952	0.2274095
102	0.159074823	0.229420464
103	0.16072016	0.231431038
104	0.162364958	0.233441226
105	0.164009209	0.235451029
106	0.165652908	0.237460449
107	0.16729605	0.239469489
108	0.168938631	0.241478148
109	0.170580646	0.243486427
110	0.172222091	0.245494326
111	0.173862964	0.247501844
112	0.17550326	0.249508982
113	0.177142978	0.251515736
114	0.178782114	0.253522106
115	0.180420666	0.25552809
116	0.182058634	0.257533686
117	0.183696015	0.259538891
118	0.185332808	0.261543702
119	0.186969013	0.263548116
120	0.188604629	0.265552131
121	0.190239656	0.267555743
122	0.191874094	0.269558947
123	0.193507943	0.271561742
124	0.195141204	0.273564121
125	0.196773878	0.275566083
126	0.198405965	0.277567622
127	0.200037467	0.279568734
128	0.201668386	0.281569416
129	0.203298724	0.283569662

Y	ℓ	u
131	0.206557662	0.287568831
132	0.208186267	0.289567745
133	0.2098143	0.291566206
134	0.211441763	0.293564209
135	0.213068659	0.295561751
136	0.214694992	0.297558826
137	0.216320765	0.299555431
138	0.217945981	0.301551561
139	0.219570645	0.303547211
140	0.221194759	0.305542378
141	0.222818328	0.307537057
142	0.224441356	0.309531244
143	0.226063847	0.311524935
144	0.227685806	0.313518126
145	0.229307237	0.315510813
146	0.230928145	0.317502992
147	0.232548536	0.319494661
148	0.234168412	0.321485814
149	0.235787781	0.323476449
150	0.237406647	0.325466562
151	0.239025015	0.327456149
152	0.240642891	0.329445209
153	0.242260281	0.331433737
154	0.243877189	0.333421731
155	0.245493622	0.335409187
156	0.247109586	0.337396104
157	0.248725086	0.339382478
158	0.250340129	0.341368307
159	0.251954721	0.343353589
160	0.253568867	0.34533832
161	0.255182575	0.3473225
162	0.25679585	0.349306127
163	0.258408699	0.351289197
164	0.260021129	0.353271709
165	0.261633146	0.355253662
166	0.263244757	0.357235055
167	0.264855968	0.359215884
168	0.266466787	0.36119615
169	0.26807722	0.363175851
170	0.269687275	0.365154985
171	0.271296958	0.367133551
172	0.272906276	0.36911155
173	0.274515236	0.371088978
174	0.276123846	0.373065837

130	0.204928481	0.285569468
Y	ℓ	u
176	0.279340045	0.377017841
177	0.280947648	0.378992984
178	0.28255493	0.380967556
179	0.284161899	0.382941554
180	0.285768561	0.384914978
181	0.287374925	0.386887829
182	0.288980999	0.388860106
183	0.290586789	0.390831809
184	0.292192303	0.392802938
185	0.29379755	0.394773493
186	0.295402537	0.396743473
187	0.297007271	0.39871288
188	0.298611762	0.400681713
189	0.300216015	0.402649972
190	0.301820041	0.404617658
191	0.303423846	0.406584771
192	0.305027438	0.40855131
193	0.306630826	0.410517278
194	0.308234017	0.412482673
195	0.30983702	0.414447497
196	0.311439843	0.41641175
197	0.313042494	0.418375432
198	0.314644981	0.420338544
199	0.316247313	0.422301087
200	0.317849497	0.42426306
201	0.319451543	0.426224465
202	0.321053458	0.428185302
203	0.32265525	0.430145573
204	0.324256929	0.432105276
205	0.325858502	0.434064414
206	0.327459979	0.436022986
207	0.329061367	0.437980994
208	0.330662674	0.439938438
209	0.332263911	0.441895319
210	0.333865084	0.443851638
211	0.335466203	0.445807394
212	0.337067276	0.44776259
213	0.338668312	0.449717225
214	0.34026932	0.4516713
215	0.341870308	0.453624816
216	0.343471285	0.455577774
217	0.34507226	0.457530175
218	0.346673242	0.459482018
219	0.348274238	0.461433305

175	0.277732114	0.375042125
Y	ℓ	u
221	0.351476313	0.465334213
222	0.353077409	0.467283835
223	0.354678555	0.469232904
224	0.356279761	0.471181419
225	0.357881036	0.473129382
226	0.359482389	0.475076793
227	0.361083828	0.477023653
228	0.362685363	0.478969963
229	0.364287002	0.480915722
230	0.365888756	0.482860932
231	0.367490633	0.484805592
232	0.369092641	0.486749705
233	0.370694792	0.488693269
234	0.372297092	0.490636286
235	0.373899553	0.492578756
236	0.375502182	0.494520679
237	0.37710499	0.496462056
238	0.378707985	0.498402888
239	0.380311178	0.500343174
240	0.381914577	0.502282915
241	0.383518192	0.504222112
242	0.385122032	0.506160764
243	0.386726107	0.508098873
244	0.388330426	0.510036438
245	0.389934999	0.511973459
246	0.391539835	0.513909938
247	0.393144945	0.515845874
248	0.394750337	0.517781267
249	0.396356021	0.519716118
250	0.397962008	0.521650427
251	0.399568306	0.523584193
252	0.401174926	0.525517418
253	0.402781877	0.527450101
254	0.40438917	0.529382242
255	0.405996814	0.531313841
256	0.407604819	0.533244899
257	0.409213195	0.535175415
258	0.410821953	0.53710539
259	0.412431101	0.539034823
260	0.414040651	0.540963715
261	0.415650613	0.542892064
262	0.417260996	0.544819872
263	0.418871812	0.546747138
264	0.42048307	0.548673862

220	0.349875259	0.463384036
Y	ℓ	u
266	0.423706957	0.552525683
267	0.425319607	0.55445078
268	0.426932745	0.556375334
269	0.428546381	0.558299345
270	0.430160531	0.560222812
271	0.431775208	0.562145736
272	0.43339043	0.564068116
273	0.435006216	0.565989952
274	0.436622589	0.567911242
275	0.438239579	0.569831988
276	0.439857219	0.571752188
277	0.441475553	0.573671842
278	0.443094634	0.57559095
279	0.444714526	0.577509511
280	0.446335311	0.579427524
281	0.447957085	0.581344989
282	0.449579967	0.583261906
283	0.451204098	0.585178273
284	0.452829646	0.587094091
285	0.454456805	0.589009358
286	0.456085803	0.590924074
287	0.457716897	0.592838238
288	0.45935038	0.594751849
289	0.460986575	0.596664907
290	0.462625839	0.598577411
291	0.464268562	0.60048936
292	0.465915159	0.602400753
293	0.467566073	0.60431159
294	0.469221765	0.606221869
295	0.470882713	0.608131589
296	0.472549402	0.61004075
297	0.474222323	0.611949351
298	0.475901959	0.61385739
299	0.477588786	0.615764867
300	0.47928326	0.61767178
301	0.480985812	0.619578129
302	0.482696843	0.621483912
303	0.484416719	0.623389128
304	0.486145765	0.625293775
305	0.487884259	0.627197854
306	0.489632435	0.629101362
307	0.491390477	0.631004299
308	0.493158517	0.632906662
309	0.49493664	0.63480845

265	0.422094781	0.550600044
Y	ℓ	u
311	0.498523227	0.638610299
312	0.500331622	0.640510356
313	0.50214997	0.642409833
314	0.503978134	0.644308728
315	0.505815945	0.64620704
316	0.507663205	0.648104767
317	0.509519689	0.650001908
318	0.51138515	0.651898461
319	0.513259326	0.653794424
320	0.515141939	0.655689795
321	0.517032702	0.657584574
322	0.518931322	0.659478757
323	0.520837502	0.661372344
324	0.522750945	0.663265332
325	0.524671355	0.66515772
326	0.526598441	0.667049505
327	0.528531918	0.668940685
328	0.530471508	0.670831259
329	0.532416941	0.672721225
330	0.534367959	0.67461058
331	0.536324313	0.676499322
332	0.538285764	0.678387449
333	0.540252088	0.680274958
334	0.542223068	0.682161848
335	0.544198503	0.684048117
336	0.546178201	0.685933761
337	0.548161984	0.687818778
338	0.550149683	0.689703167
339	0.552141141	0.691586923
340	0.554136212	0.693470046
341	0.55613476	0.695352532
342	0.55813666	0.697234378
343	0.560141795	0.699115583
344	0.562150056	0.700996142
345	0.564161346	0.702876054
346	0.566175573	0.704755315
347	0.568192654	0.706633923
348	0.570212512	0.708511874
349	0.572235079	0.710389166
350	0.574260291	0.712265795
351	0.57628809	0.714141758
352	0.578318426	0.716017053
353	0.580351251	0.717891675
354	0.582386523	0.719765622

310	0.49672488	0.636709663
Y	ℓ	u
356	0.586464265	0.723511475
357	0.588506672	0.725383375
358	0.5905514	0.727254585
359	0.592598427	0.729125101
360	0.594647734	0.730994922
361	0.596699303	0.732864041
362	0.598753121	0.734732456
363	0.600809176	0.736600162
364	0.602867459	0.738467156
365	0.604927962	0.740333433
366	0.60699068	0.74219899
367	0.609055609	0.744063821
368	0.611122748	0.745927923
369	0.613192096	0.747791291
370	0.615263654	0.749653921
371	0.617337424	0.751515808
372	0.619413411	0.753376948
373	0.621491619	0.755237335
374	0.623572054	0.757096965
375	0.625654722	0.758955832
376	0.627739632	0.760813933
377	0.629826792	0.762671261
378	0.631916212	0.764527811
379	0.634007902	0.766383579
380	0.636101874	0.768238557
381	0.638198138	0.770092742
382	0.640296709	0.771946127
383	0.642397598	0.773798706
384	0.64450082	0.775650474
385	0.64660639	0.777501424
386	0.648714321	0.77935155
387	0.650824631	0.781200846
388	0.652937335	0.783049306
389	0.655052449	0.784896922
390	0.657169992	0.786743689
391	0.65928998	0.788589598
392	0.661412433	0.790434644
393	0.663537369	0.79227882
394	0.665664808	0.794122117
395	0.667794769	0.795964528
396	0.669927274	0.797806046
397	0.672062343	0.799646663
398	0.674199997	0.801486371
399	0.67634026	0.803325162

355	0.584424206	0.721638889
Y	ℓ	u
401	0.680628699	0.806999959
402	0.682776924	0.808835948
403	0.68492785	0.810670985
404	0.687081504	0.812505061
405	0.68923791	0.814338168
406	0.691397095	0.816170294
407	0.693559086	0.818001432
408	0.695723911	0.81983157
409	0.697891596	0.821660699
410	0.700062172	0.823488808
411	0.702235668	0.825315886
412	0.704412115	0.827141922
413	0.706591543	0.828966905
414	0.708773984	0.830790824
415	0.71095947	0.832613667
416	0.713148037	0.834435421
417	0.715339716	0.836256074
418	0.717534545	0.838075614
419	0.719732559	0.839894027
420	0.721933794	0.8417113
421	0.72413829	0.843527419
422	0.726346084	0.84534237
423	0.728557217	0.847156138
424	0.730771731	0.848968709
425	0.732989667	0.850780067
426	0.735211069	0.852590196
427	0.737435981	0.854399081
428	0.739664449	0.856206704
429	0.74189652	0.858013049
430	0.744132243	0.859818098
431	0.746371668	0.861621832
432	0.748614845	0.863424233
433	0.750861829	0.865225282
434	0.753112672	0.867024959
435	0.755367431	0.868823244
436	0.757626164	0.870620115
437	0.75988893	0.872415551
438	0.762155791	0.874209529
439	0.76442681	0.876002026
440	0.766702052	0.877793018
441	0.768981584	0.879582482
442	0.771265476	0.88137039
443	0.773553801	0.883156717
444	0.775846631	0.884941436

400	0.678483153	0.805163028
Y	ℓ	u
446	0.780446121	0.888505935
447	0.782752942	0.890285655
448	0.785064593	0.892063648
449	0.787381162	0.893839882
450	0.789702741	0.895614321
451	0.792029423	0.897386933
452	0.794361309	0.899157679
453	0.796698499	0.900926523
454	0.799041099	0.902693426
455	0.801389221	0.904458346
456	0.803742978	0.906221241
457	0.806102489	0.907982067
458	0.808467879	0.909740778
459	0.810839277	0.911497326
460	0.813216818	0.91325166
461	0.815600642	0.915003729
462	0.817990896	0.916753477
463	0.820387734	0.918500847
464	0.822791315	0.92024578
465	0.825201809	0.921988211
466	0.82761939	0.923728076
467	0.830044243	0.925465306
468	0.832476562	0.927199826
469	0.834916549	0.928931562
470	0.837364418	0.930660432
471	0.839820395	0.93238635
472	0.842284716	0.934109229
473	0.84475763	0.935828972
474	0.847239402	0.93754548
475	0.849730311	0.939258646
476	0.852230652	0.940968357
477	0.854740738	0.942674495
478	0.857260902	0.94437693
479	0.859791498	0.946075528
480	0.862332901	0.947770142
481	0.864885515	0.949460619
482	0.867449767	0.951146792
483	0.870026118	0.952828482
484	0.87261506	0.954505497
485	0.875217124	0.95617763
486	0.87783288	0.957844657
487	0.880462944	0.959506335
488	0.883107985	0.9611624
489	0.885768725	0.962812566

445	0.778144045	0.886724518
Y	ℓ	u
491	0.891140532	0.966093907
492	0.893853401	0.967724359
493	0.896585597	0.969347452
494	0.899338265	0.970962721
495	0.90211267	0.972569645
496	0.904910222	0.974167643
497	0.907732498	0.975756059
498	0.910581271	0.977334149
499	0.913458545	0.978901064
500	0.916366605	0.980455828
501	0.919308068	0.981997308
502	0.922285961	0.98352418
503	0.925303817	0.985034874
504	0.928365802	0.986527512
505	0.931476886	0.987999812
506	0.934643084	0.989448953
507	0.937871792	0.990871383
508	0.941172284	0.992262519
509	0.944556459	0.99361627
510	0.948040036	0.99492425
511	0.951644542	0.996174341
512	0.955400912	0.997347891
513	0.959356594	0.998413507
514	0.963591708	0.999310884
515	0.968264419	0.999900599
516	0.992876502	1

490	0.888445954	0.964456516

3. $\delta = 0.01$ dan $\lambda \to 0$

Y	ℓ	u
0	0	0.008913627
1	0.000123214	0.024005376
2	0.000858321	0.028896643
3	0.001979297	0.033374853
4	0.00331168	0.037592835
5	0.004779847	0.041626889
6	0.006344396	0.045521725
7	0.007981903	0.049306251
8	0.009677144	0.053000453
9	0.011419576	0.056618844
10	0.013201546	0.060172365
11	0.015017288	0.063669506
12	0.016862333	0.067117019
13	0.018733135	0.070520377
14	0.020626821	0.073884092
15	0.022541024	0.077211937
16	0.024473772	0.080507106
17	0.026423395	0.083397634
18	0.028388466	0.083397634
19	0.030367756	0.083397634
20	0.032360196	0.083397634
21	0.034364847	0.083397634
22	0.036380883	0.083397634
23	0.038407571	0.083397634
24	0.040444255	0.083397634
25	0.042490347	0.083790641
26	0.044545319	0.086556625
27	0.046608692	0.089314627
28	0.04868003	0.092065047
29	0.050758936	0.094808247
30	0.052845049	0.097544563
31	0.054938034	0.100274302
32	0.057037587	0.102997747
33	0.059143422	0.105715161
34	0.061255281	0.108426788
35	0.063372918	0.111132853
36	0.06549611	0.113833568
37	0.067624646	0.116529127
38	0.06975833	0.119219717
39	0.07189698	0.121905507
40	0.074040423	0.12458666
41	0.076188498	0.127263328
42	0.078341054	0.129935653

Y	ℓ	u
43	0.080497949	0.132603769
44	0.082659048	0.135267804
45	0.083397634	0.137927878
46	0.083397634	0.140584103
47	0.083397634	0.143236588
48	0.083397634	0.145885435
49	0.083397634	0.14853074
50	0.083397634	0.151172596
51	0.083397634	0.15381109
52	0.083397634	0.156446305
53	0.083397634	0.159078322
54	0.083397634	0.161707215
55	0.084195668	0.164333057
56	0.086162747	0.166955918
57	0.088135657	0.169575864
58	0.090114269	0.172192958
59	0.092098461	0.174807261
60	0.094088117	0.177418831
61	0.096083124	0.180027724
62	0.098083373	0.182633993
63	0.100088761	0.18523769
64	0.102099188	0.187838865
65	0.104114559	0.190437565
66	0.106134782	0.193033835
67	0.108159767	0.195627721
68	0.110189429	0.198219264
69	0.112223687	0.200808505
70	0.11426246	0.203395484
71	0.116305671	0.205980239
72	0.118353249	0.208562806
73	0.120405119	0.211143221
74	0.122461215	0.213721519
75	0.124521469	0.216297732
76	0.126585816	0.218871892
77	0.128654195	0.221444031
78	0.130726545	0.224014179
79	0.132802809	0.226582364
80	0.134882928	0.229148615
81	0.13696685	0.231712958
82	0.13905452	0.234275421
83	0.141145888	0.236836028
84	0.143240903	0.239394806
85	0.145339517	0.241951776

Y	ℓ	u
86	0.147441683	0.244506964
87	0.149547357	0.247060392
88	0.151656492	0.249612081
89	0.153769048	0.252162054
90	0.155884982	0.25471033
91	0.158004253	0.25725693
92	0.160126822	0.259801874
93	0.162252651	0.262345181
94	0.164381703	0.264886869
95	0.166513941	0.267426956
96	0.168649331	0.26996546
97	0.170787837	0.272502398
98	0.172929428	0.275037786
99	0.175074069	0.277571642
100	0.17722173	0.280103979
101	0.179372381	0.282634814
102	0.18152599	0.285164163
103	0.183682528	0.287692038
104	0.185841968	0.290218455
105	0.188004282	0.292743427
106	0.190169442	0.295266968
107	0.192337422	0.297789091
108	0.194508197	0.300309808
109	0.196681741	0.302829133
110	0.19885803	0.305347077
111	0.20103704	0.307863652
112	0.203218748	0.31037887
113	0.205403132	0.312892743
114	0.207590168	0.31540528
115	0.209779836	0.317916494
116	0.211972115	0.320426393
117	0.214166983	0.32293499
118	0.216364421	0.325442294
119	0.21856441	0.327948313
120	0.220766929	0.330453059
121	0.222971961	0.332956541
122	0.225179487	0.335458767
123	0.227389489	0.337959746
124	0.22960195	0.340459487
125	0.231816853	0.342957999
126	0.234034181	0.34545529
127	0.236253919	0.347951367
128	0.238476049	0.350446239
129	0.240700558	0.352939914

Y	ℓ	u
131	0.245156648	0.357923701
132	0.2473882	0.360413827
133	0.249622072	0.362902786
134	0.251858249	0.365390582
135	0.254096719	0.367877224
136	0.256337468	0.370362718
137	0.258580483	0.372847069
138	0.260825751	0.375330285
139	0.263073261	0.377812371
140	0.265323001	0.380293334
141	0.267574959	0.382773179
142	0.269829123	0.385251911
143	0.272085482	0.387729537
144	0.274344026	0.390206062
145	0.276604743	0.392681491
146	0.278867625	0.395155829
147	0.281132659	0.397629082
148	0.283399837	0.400101253
149	0.285669149	0.402572349
150	0.287940586	0.405042373
151	0.290214138	0.40751133
152	0.292489796	0.409979225
153	0.294767552	0.412446062
154	0.297047397	0.414911845
155	0.299329323	0.417376578
156	0.301613322	0.419840266
157	0.303899385	0.422302912
158	0.306187506	0.42476452
159	0.308477677	0.427225094
160	0.31076989	0.429684637
161	0.313064139	0.432143153
162	0.315360416	0.434600645
163	0.317658715	0.437057117
164	0.319959029	0.439512572
165	0.322261352	0.441967013
166	0.324565678	0.444420443
167	0.326872001	0.446872865
168	0.329180315	0.449324281
169	0.331490615	0.451774696
170	0.333802894	0.45422411
171	0.336117148	0.456672528
172	0.338433371	0.459119951
173	0.340751559	0.461566382
174	0.343071707	0.464011824

130	0.242927429	0.355432399
Y	ℓ	u
176	0.347717863	0.468899747
177	0.350043862	0.471342232
178	0.352371804	0.473783737
179	0.354701684	0.476224263
180	0.357033497	0.478663811
181	0.359367242	0.481102385
182	0.361702913	0.483539984
183	0.364040508	0.485976612
184	0.366380023	0.488412269
185	0.368721456	0.490846958
186	0.371064802	0.493280679
187	0.373410059	0.495713434
188	0.375757226	0.498145225
189	0.378106298	0.500576052
190	0.380457274	0.503005917
191	0.382810151	0.505434821
192	0.385164927	0.507862764
193	0.387521601	0.510289749
194	0.38988017	0.512715775
195	0.392240632	0.515140843
196	0.394602987	0.517564955
197	0.396967232	0.519988111
198	0.399333366	0.522410311
199	0.401701388	0.524831556
200	0.404071298	0.527251847
201	0.406443093	0.529671183
202	0.408816774	0.532089566
203	0.411192339	0.534506996
204	0.413569788	0.536923472
205	0.415949122	0.539338995
206	0.418330338	0.541753565
207	0.420713438	0.544167182
208	0.423098421	0.546579846
209	0.425485288	0.548991557
210	0.427874039	0.551402314
211	0.430264673	0.553812118
212	0.432657193	0.556220967
213	0.435051598	0.558628862
214	0.437447888	0.561035802
215	0.439846067	0.563441787
216	0.442246133	0.565846815
217	0.444648088	0.568250887
218	0.447051935	0.570654001
219	0.449457673	0.573056157

175	0.345393809	0.466456278
Y	ℓ	u
221	0.454274834	0.57785759
222	0.456686259	0.580256866
223	0.459099584	0.582655179
224	0.46151481	0.585052529
225	0.46393194	0.587448914
226	0.466350977	0.589844333
227	0.468771923	0.592238785
228	0.47119478	0.594632268
229	0.473619551	0.597024781
230	0.47604624	0.599416321
231	0.47847485	0.601806889
232	0.480905384	0.604196481
233	0.483337845	0.606585095
234	0.485772237	0.608972731
235	0.488208564	0.611359386
236	0.490646829	0.613745058
237	0.493087037	0.616129745
238	0.495529192	0.618513444
239	0.497973297	0.620896154
240	0.500419359	0.623277871
241	0.502867381	0.625658594
242	0.505317368	0.62803832
243	0.507769325	0.630417047
244	0.510223257	0.632794771
245	0.51267917	0.63517149
246	0.515137069	0.637547202
247	0.51759696	0.639921902
248	0.520058848	0.642295588
249	0.52252274	0.644668257
250	0.524988642	0.647039906
251	0.52745656	0.649410531
252	0.529926501	0.65178013
253	0.532398471	0.654148697
254	0.534872477	0.656516231
255	0.537348527	0.658882726
256	0.539826627	0.66124818
257	0.542306786	0.663612588
258	0.54478901	0.665975947
259	0.547273309	0.668338252
260	0.549759689	0.670699498
261	0.55224816	0.673059683
262	0.554738729	0.675418801
263	0.557231406	0.677776847
264	0.5597262	0.680133818

220	0.451865306	0.575457354
Y	ℓ	u
266	0.564722174	0.684844512
267	0.567223373	0.687198226
268	0.569726727	0.689550843
269	0.572232246	0.69190236
270	0.57473994	0.69425277
271	0.57724982	0.696602068
272	0.579761896	0.698950248
273	0.582276181	0.701297304
274	0.584792685	0.703643232
275	0.587311421	0.705988023
276	0.589832399	0.708331673
277	0.592355633	0.710674174
278	0.594881135	0.713015521
279	0.597408918	0.715355706
280	0.599938994	0.717694723
281	0.602471379	0.720032565
282	0.605006084	0.722369224
283	0.607543125	0.724704693
284	0.610082516	0.727038965
285	0.612624272	0.729372032
286	0.615168407	0.731703886
287	0.617714938	0.734034519
288	0.62026388	0.736363922
289	0.62281525	0.738692088
290	0.625369065	0.741019007
291	0.62792534	0.743344671
292	0.630484095	0.74566907
293	0.633045346	0.747992196
294	0.635609112	0.750314038
295	0.638175412	0.752634587
296	0.640744265	0.754953833
297	0.64331569	0.757271766
298	0.645889709	0.759588375
299	0.64846634	0.761903649
300	0.651045607	0.764217578
301	0.65362753	0.766530149
302	0.656212132	0.768841352
303	0.658799434	0.771151175
304	0.661389462	0.773459605
305	0.663982238	0.77576663
306	0.666577788	0.778072238
307	0.669176136	0.780376414
308	0.671777307	0.782679146
309	0.67438133	0.784980419

265	0.562223119	0.682489708
Y	ℓ	u
311	0.679598036	0.789578534
312	0.682210776	0.791875346
313	0.68482648	0.794170641
314	0.687445177	0.796464403
315	0.690066899	0.798756616
316	0.692691677	0.801047263
317	0.695319544	0.803336327
318	0.697950534	0.805623791
319	0.70058468	0.807909636
320	0.703222019	0.810193844
321	0.705862587	0.812476397
322	0.70850642	0.814757274
323	0.711153558	0.817036455
324	0.713804041	0.81931392
325	0.716457908	0.821589646
326	0.719115202	0.823863613
327	0.721775966	0.826135798
328	0.724440244	0.828406177
329	0.727108082	0.830674726
330	0.729779528	0.83294142
331	0.73245463	0.835206234
332	0.735133438	0.837469141
333	0.737816005	0.839730115
334	0.740502382	0.841989126
335	0.743192625	0.844246147
336	0.745886792	0.846501147
337	0.748584941	0.848754095
338	0.751287133	0.85100496
339	0.75399343	0.853253707
340	0.756703897	0.855500303
341	0.759418602	0.857744713
342	0.762137613	0.859986899
343	0.764861003	0.862226824
344	0.767588847	0.864464448
345	0.770321221	0.866699731
346	0.773058206	0.868932629
347	0.775799884	0.871163099
348	0.778546342	0.873391096
349	0.78129767	0.875616571
350	0.78405396	0.877839475
351	0.786815309	0.880059757
352	0.789581817	0.882277363
353	0.792353591	0.884492238
354	0.795130737	0.886704323

310	0.67698823	0.78728022
Y	ℓ	u
356	0.80070161	0.89111988
357	0.803495579	0.893323221
358	0.806295407	0.895523514
359	0.809101228	0.897720686
360	0.811913185	0.89991466
361	0.814731425	0.902105359
362	0.817556102	0.904292697
363	0.820387381	0.906476589
364	0.82322543	0.908656942
365	0.826070431	0.910833659
366	0.82892257	0.913006639
367	0.831782048	0.915175775
368	0.834649072	0.917340952
369	0.837523865	0.919502051
370	0.840406658	0.921658946
371	0.8432977	0.923811502
372	0.846197251	0.925959577
373	0.849105589	0.92810302
374	0.852023008	0.93024167
375	0.854949822	0.932375354
376	0.857886363	0.93450389
377	0.860832989	0.936627082
378	0.86379008	0.938744719
379	0.866758044	0.940856578
380	0.869737319	0.942962413
381	0.872728375	0.945061966
382	0.875731719	0.947154951
383	0.878747901	0.949241064
384	0.881777513	0.95131997
385	0.8848212	0.953391308
386	0.887879665	0.955454681
387	0.890953675	0.957509653
388	0.894044071	0.959555745
389	0.897151778	0.961592429
390	0.900277817	0.963619117
391	0.903423322	0.965635153
392	0.906589555	0.967639804
393	0.909777928	0.969632244
394	0.912990033	0.971611534
395	0.91622767	0.973576605
396	0.919492894	0.975526228
397	0.922788063	0.977458976
398	0.926115908	0.979373179
399	0.929479623	0.981266865

355	0.797913371	0.888913558
Y	ℓ	u
401	0.936330494	0.984982712
402	0.939827635	0.986798454
403	0.943381156	0.988580424
404	0.946999547	0.990322856
405	0.950693749	0.992018097
406	0.954478275	0.993655604
407	0.958373111	0.995220153
408	0.962407165	0.99668832
409	0.966625147	0.998020703
410	0.971103357	0.999141679
411	0.975994624	0.999876786
412	0.991086373	1

400	0.932882981	0.983137667

4. $\delta = 0$ dan $\lambda \to 0$

Y	ℓ	u
0	0	0.008956913
1	0.000125098	0.083397634
2	0.000867418	0.083397634
3	0.001997253	0.083397634
4	0.003339149	0.083397634
5	0.004817196	0.083397634
6	0.006391868	0.083397634
7	0.008039674	0.083397634
8	0.00974535	0.083397634
9	0.011498327	0.083397634
10	0.013290932	0.083397634
11	0.015117387	0.083397634
12	0.016973214	0.083397634
13	0.018854855	0.083397634
14	0.020759433	0.083397634
15	0.022684575	0.083397634
16	0.024628305	0.083397634
17	0.026588949	0.083397634
18	0.028565077	0.083397634
19	0.030555458	0.083397634
20	0.032559019	0.083397634
21	0.03457482	0.083397634
22	0.036602034	0.083397634
23	0.038639924	0.083397634
24	0.040687835	0.083397634
25	0.042745177	0.084124715
26	0.04481142	0.086902965
27	0.046886085	0.089673213
28	0.048968735	0.09243586
29	0.051058973	0.095191269
30	0.053156434	0.097939777
31	0.055260786	0.100681691
32	0.057371721	0.103417296
33	0.059488957	0.106146854
34	0.06161223	0.108870609
35	0.063741297	0.111588788
36	0.065875934	0.114301603
37	0.068015929	0.117009249
38	0.070161085	0.119711911
39	0.072311221	0.122409762
40	0.074466162	0.125102963
41	0.076625749	0.127791666
42	0.078789829	0.130476014

Y	ℓ	u
43	0.08095826	0.133156142
44	0.083130907	0.135832177
45	0.083397634	0.138504239
46	0.083397634	0.141172443
47	0.083397634	0.143836895
48	0.083397634	0.146497698
49	0.083397634	0.14915495
50	0.083397634	0.151808742
51	0.083397634	0.154459162
52	0.083397634	0.157106294
53	0.083397634	0.159750217
54	0.083397634	0.162391008
55	0.083397634	0.165028739
56	0.083397634	0.167663479
57	0.083397634	0.170295295
58	0.083397634	0.17292425
59	0.083397634	0.175550405
60	0.083397634	0.178173818
61	0.083397634	0.180794546
62	0.083397634	0.183412642
63	0.083397634	0.186028158
64	0.083397634	0.188641143
65	0.083397634	0.191251644
66	0.083397634	0.193859709
67	0.083397634	0.19646538
68	0.083397634	0.199068701
69	0.083397634	0.201669712
70	0.083397634	0.204268454
71	0.083397634	0.206864963
72	0.083397634	0.209459278
73	0.083397634	0.212051433
74	0.083397634	0.214641463
75	0.083397634	0.217229401
76	0.083397634	0.219815279
77	0.083397634	0.222399128
78	0.083397634	0.224980979
79	0.083397634	0.227560859
80	0.083397634	0.230138799
81	0.083397634	0.232714824
82	0.083397634	0.235288961
83	0.083397634	0.237861236
84	0.083397634	0.240431674
85	0.083397634	0.243000299

Y	ℓ	u
86	0.083397634	0.245567134
87	0.083397634	0.248132202
88	0.083397634	0.250695524
89	0.083397634	0.253257123
90	0.083397634	0.255817019
91	0.083397634	0.258375233
92	0.083397634	0.260931783
93	0.083397634	0.26348669
94	0.083397634	0.266039971
95	0.083397634	0.268591645
96	0.083397634	0.271141729
97	0.083397634	0.273690241
98	0.083397634	0.276237196
99	0.083397634	0.278782612
100	0.083397634	0.281326504
101	0.083397634	0.283868887
102	0.083397634	0.286409776
103	0.083397634	0.288949187
104	0.083397634	0.291487132
105	0.083397634	0.294023626
106	0.083397634	0.296558683
107	0.083397634	0.299092315
108	0.083397634	0.301624535
109	0.083397634	0.304155357
110	0.083397634	0.306684791
111	0.083397634	0.309212851
112	0.083397634	0.311739547
113	0.083397634	0.31426489
114	0.083397634	0.316788893
115	0.083397634	0.319311565
116	0.083397634	0.321832918
117	0.083397634	0.324352961
118	0.083397634	0.326871704
119	0.083397634	0.329389158
120	0.083397634	0.331905332
121	0.083397634	0.334420234
122	0.083397634	0.336933875
123	0.083397634	0.339446263
124	0.083397634	0.341957407
125	0.083397634	0.344467314
126	0.083397634	0.346975995
127	0.083397634	0.349483456
128	0.083397634	0.351989705
129	0.083397634	0.354494751

Y	ℓ	u
131	0.083397634	0.359501261
132	0.083397634	0.36200274
133	0.083397634	0.364503044
134	0.083397634	0.36700218
135	0.083397634	0.369500155
136	0.083397634	0.371996976
137	0.083397634	0.374492648
138	0.083397634	0.376987178
139	0.083397634	0.379480572
140	0.083397634	0.381972836
141	0.083397634	0.384463975
142	0.083397634	0.386953996
143	0.083397634	0.389442905
144	0.083397634	0.391930705
145	0.083397634	0.394417403
146	0.083397634	0.396903004
147	0.083397634	0.399387513
148	0.083397634	0.401870934
149	0.083397634	0.404353273
150	0.083397634	0.406834534
151	0.083397634	0.409314721
152	0.083397634	0.41179384
153	0.083397634	0.414271893
154	0.083397634	0.416748887
155	0.083397634	0.419224824
156	0.083397634	0.421699709
157	0.083397634	0.424173545
158	0.083397634	0.426646337
159	0.083397634	0.429118087
160	0.083397634	0.431588801
161	0.083397634	0.43405848
162	0.083397634	0.436527129
163	0.083397634	0.438994751
164	0.083397634	0.441461348
165	0.083397634	0.443926925
166	0.083397634	0.446391484
167	0.083397634	0.448855028
168	0.083397634	0.451317559
169	0.083397634	0.453779082
170	0.083397634	0.456239597
171	0.083397634	0.458699109
172	0.083397634	0.461157619
173	0.083397634	0.463615129
174	0.083397634	0.466071643

130	0.083397634	0.356998601
Y	ℓ	u
176	0.083397634	0.470981689
177	0.083397634	0.473435225
178	0.083397634	0.475887773
179	0.083397634	0.478339335
180	0.083397634	0.480789912
181	0.083397634	0.483239506
182	0.083397634	0.485688119
183	0.083397634	0.488135753
184	0.083397634	0.490582408
185	0.083397634	0.493028087
186	0.083397634	0.495472792
187	0.083397634	0.497916522
188	0.083397634	0.50035928
189	0.083397634	0.502801067
190	0.083397634	0.505241883
191	0.083397634	0.507681731
192	0.083397634	0.51012061
193	0.083397634	0.512558523
194	0.083397634	0.514995468
195	0.083397634	0.517431448
196	0.083397634	0.519866463
197	0.083397634	0.522300514
198	0.083397634	0.524733601
199	0.083397634	0.527165725
200	0.083397634	0.529596886
201	0.083397634	0.532027084
202	0.083397634	0.53445632
203	0.083397634	0.536884594
204	0.083397634	0.539311906
205	0.083397634	0.541738256
206	0.083397634	0.544163644
207	0.083397634	0.54658807
208	0.083397634	0.549011534
209	0.083397634	0.551434036
210	0.083397634	0.553855576
211	0.083397634	0.556276152
212	0.083397634	0.558695765
213	0.083397634	0.561114415
214	0.083397634	0.5635321
215	0.083397634	0.56594882
216	0.083397634	0.568364574
217	0.083397634	0.570779362
218	0.083397634	0.573193183
219	0.083397634	0.575606036

175	0.083397634	0.468527162
Y	ℓ	u
221	0.083397634	0.580428833
222	0.083397634	0.582838775
223	0.083397634	0.585247745
224	0.083397634	0.587655741
225	0.083397634	0.590062762
226	0.083397634	0.592468807
227	0.083397634	0.594873874
228	0.083397634	0.597277961
229	0.083397634	0.599681068
230	0.083397634	0.602083191
231	0.083397634	0.60448433
232	0.083397634	0.606884483
233	0.083397634	0.609283647
234	0.083397634	0.611681821
235	0.083397634	0.614079002
236	0.083397634	0.616475189
237	0.083397634	0.618870379
238	0.083397634	0.62126457
239	0.083397634	0.623657759
240	0.083397634	0.626049944
241	0.083397634	0.628441123
242	0.083397634	0.630831292
243	0.083397634	0.633220449
244	0.083397634	0.635608591
245	0.083397634	0.637995715
246	0.083397634	0.640381819
247	0.083397634	0.642766898
248	0.083397634	0.645150951
249	0.083397634	0.647533973
250	0.083397634	0.64991596
251	0.083397634	0.652296911
252	0.083397634	0.654676821
253	0.083397634	0.657055686
254	0.083397634	0.659433503
255	0.083397634	0.661810267
256	0.083397634	0.664185975
257	0.083397634	0.666560623
258	0.083397634	0.668934206
259	0.083397634	0.671306721
260	0.083397634	0.673678162
261	0.083397634	0.676048525
262	0.083397634	0.678417806
263	0.083397634	0.680785999
264	0.083397634	0.6831531

220	0.083397634	0.57801792
Y	ℓ	u
266	0.083397634	0.687884006
267	0.083397634	0.690247801
268	0.083397634	0.692610482
269	0.083397634	0.694972045
270	0.083397634	0.697332484
271	0.083397634	0.699691792
272	0.083397634	0.702049965
273	0.083397634	0.704406996
274	0.083397634	0.706762879
275	0.083397634	0.709117607
276	0.083397634	0.711471174
277	0.083397634	0.713823574
278	0.083397634	0.716174798
279	0.083397634	0.718524842
280	0.083397634	0.720873696
281	0.083397634	0.723221354
282	0.083397634	0.725567809
283	0.083397634	0.727913052
284	0.083397634	0.730257076
285	0.083397634	0.732599872
286	0.083397634	0.734941433
287	0.083397634	0.73728175
288	0.083397634	0.739620814
289	0.083397634	0.741958616
290	0.083397634	0.744295148
291	0.083397634	0.7466304
292	0.083397634	0.748964362
293	0.083397634	0.751297024
294	0.083397634	0.753628378
295	0.083397634	0.755958411
296	0.083397634	0.758287115
297	0.083397634	0.760614478
298	0.083397634	0.762940488
299	0.083397634	0.765265136
300	0.083397634	0.767588408
301	0.083397634	0.769910294
302	0.083397634	0.772230781
303	0.083397634	0.774549857
304	0.083397634	0.776867508
305	0.083397634	0.779183722
306	0.083397634	0.781498485
307	0.083397634	0.783811784
308	0.083397634	0.786123603
309	0.083397634	0.788433929

265	0.083397634	0.685519105
Y	ℓ	u
311	0.083397634	0.793050041
312	0.083397634	0.795355796
313	0.083397634	0.797659995
314	0.083397634	0.799962621
315	0.083397634	0.802263659
316	0.083397634	0.804563089
317	0.083397634	0.806860894
318	0.083397634	0.809157056
319	0.083397634	0.811451555
320	0.083397634	0.813744372
321	0.083397634	0.816035486
322	0.083397634	0.818324877
323	0.083397634	0.820612523
324	0.083397634	0.822898403
325	0.083397634	0.825182494
326	0.083397634	0.827464772
327	0.083397634	0.829745212
328	0.083397634	0.832023792
329	0.083397634	0.834300484
330	0.083397634	0.836575262
331	0.083397634	0.8388481
332	0.083397634	0.841118968
333	0.083397634	0.843387838
334	0.083397634	0.845654681
335	0.083397634	0.847919464
336	0.083397634	0.850182155
337	0.083397634	0.852442723
338	0.083397634	0.854701131
339	0.083397634	0.856957346
340	0.083397634	0.859211329
341	0.083397634	0.861463044
342	0.083397634	0.86371245
343	0.083397634	0.865959506
344	0.083397634	0.86820417
345	0.083397634	0.870446398
346	0.083397634	0.872686144
347	0.083397634	0.87492336
348	0.083397634	0.877157997
349	0.083397634	0.879390004
350	0.083397634	0.881619326
351	0.083397634	0.883845908
352	0.083397634	0.886069692
353	0.083397634	0.888290616
354	0.083397634	0.890508618

310	0.083397634	0.790742747
Y	ℓ	u
356	0.083397634	0.894935586
357	0.083397634	0.89714441
358	0.083397634	0.899350027
359	0.083397634	0.901552359
360	0.083397634	0.903751321
361	0.083397634	0.905946825
362	0.083397634	0.908138781
363	0.083397634	0.91032709
364	0.083397634	0.912511652
365	0.083397634	0.914692357
366	0.083397634	0.916869093
367	0.083397634	0.91904174
368	0.083397634	0.921210171
369	0.083397634	0.923374251
370	0.083397634	0.925533838
371	0.083397634	0.927688779
372	0.083397634	0.929838915
373	0.083397634	0.931984071
374	0.083397634	0.934124066
375	0.083397634	0.936258703
376	0.083397634	0.93838777
377	0.083397634	0.940511043
378	0.083397634	0.942628279
379	0.083397634	0.944739214
380	0.083397634	0.946843566
381	0.083397634	0.948941027
382	0.083397634	0.951031265
383	0.083397634	0.953113915
384	0.083397634	0.95518858
385	0.083397634	0.957254823
386	0.083397634	0.959312165
387	0.083397634	0.961360076
388	0.083397634	0.963397966
389	0.083397634	0.96542518
390	0.083397634	0.967440981
391	0.083397634	0.969444542
392	0.083397634	0.971434923
393	0.083397634	0.973411051
394	0.083397634	0.975371695
395	0.083397634	0.977315425
396	0.083397634	0.979240567
397	0.083397634	0.981145145
398	0.083397634	0.983026786
399	0.083397634	0.984882613

355	0.083397634	0.892723631
Y	ℓ	u
400	0.083397634	0.986709068
401	0.083397634	0.988501673
402	0.083397634	0.99025465
403	0.083397634	0.991960326
404	0.083397634	0.993608132
405	0.083397634	0.995182804
406	0.083397634	0.996660851
407	0.083397634	0.998002747
408	0.083397634	0.999132582
409	0.083397634	0.999874902
410	0.991043087	1

Lampiran 3 Syntax R

```
### taraf signifikan & tail function parameter
a <- 0.05
delta <- 0.01
lambda <- 0.1
### fungsi yang digunakan ####
### tail function ####
tau <- function(p1){
  tau_p <- delta + (1-(2*delta))*pnorm((p1-eta)/lambda)
  return(tau_p)
}
# derivative of tau
dtau <- function(p1){
  dtau_p <- ((1-(2*delta))/lambda)*dnorm((p1-eta)/lambda)
  return(dtau_p)
}
### psi (persamaan untuk metode newthon-raphson) ####
### batas bawah ####
f1 <- function(p1,Y1,n1){
  l <- 0
  for (i in Y1:n1) {
    l <- l + choose(n1,i)*p1^i*(1-p1)^(n1-i)
  }
  l <- l-(a*(1-(delta + (1-(2*delta))*pnorm((p1-
eta)/lambda))))
  return(l)
}
```

```
df1 <- function(p1,Y1,n1){
  l <- 0
  for (i in Y1:n1) {
    l <- l+choose(n1,i)*
      ((i*p1^(i-1)*(1-p1)^(n1-i))+((i-n1)*p1^(i)*(1-p1)^(n1-
i-1)))
  }
  l <- l + a*(((1-(2*delta))/lambda)*dnorm((p1-eta)/lambda))
  return(l)
}
```

batas atas

```
f2 <- function(p1,Y1,n1){
  u <- 0
  for (i in 0:Y1) {
    u <- u + choose(n1,i)*p1^i*(1-p1)^(n1-i)
  }
  u <- u-(a*(delta + (1-(2*delta))*pnorm((p1-eta)/lambda)))
  return(u)
}
df2 <- function(p1,Y1,n1){
  u <- 0
  for (i in 0:Y1) {
    u <- u+choose(n1,i)*
      ((i*p1^(i-1)*(1-p1)^(n1-i))+((i-n1)*p1^(i)*(1-p1)^(n1-
i-1)))
  }
  u <- u - a*(((1-(2*delta))/lambda)*dnorm((p1-eta)/lambda))
```

```
  return(u)
}
#### newthon raphson ####
newtRap_L <- function(x0,Y1,n1,n_iter){
  for (i in 1:n_iter) {
    if(df1(x0,Y1,n1)==0){
      break
    }else{
      x0 <- x0 - (f1(x0,Y1,n1)/df1(x0,Y1,n1))
    }
  }
  return(x0)
}
newtRap_U <- function(x0,Y1,n1,n_iter){
  for (i in 1:n_iter) {
    if(df2(x0,Y1,n1)==0){
      break
    }else{
      x0 <- x0 - (f2(x0,Y1,n1)/df2(x0,Y1,n1))
    }
  }
  return(x0)
}
```

```
### Estimasi Interval ####
l <- function(Y1,n1,a){
  Y1 <- Y1 ; n1 <- n1
  if(Y1 == 0){
    return(0)
  }else if(Y1 == n1){
    return((a/2)^(1/n1))
  }else{
    if(lambda==0){
      if(qbeta(a*(1-delta),Y1,n1-Y1+1)<eta){
        l1 <- qbeta(a*(1-delta),Y1,n1-Y1+1)
        return(l1)
      }else if(qbeta(a*delta,Y1,n1-Y1+1)>eta){
        l1 <- qbeta(a*delta,Y1,n1-Y1+1)
        return(l1)
      }else{
        return(eta)
      }
    }else{
      l1 <- qbeta(a/2,Y1,n1-Y1+1)
      l2 <- newtRap_L(l1,Y1,n1,10)
      return(l2)
    }
  }
}
```

```
u <- function(Y1,n1,a){
  Y1 <- Y1 ; n1 <- n1
  if(Y1==0){
   return(1-((a/2)^(1/n1)))
  }else if(Y1==n1){
    return(1)
  }else{
    if(lambda==0){
      if(qbeta(1-(a*(1-delta)),Y1+1,n1-Y1)>eta){
        u1 <- qbeta(1-(a*(1-delta)),Y1+1,n1-Y1)
        return(u1)
      }else if(qbeta(1-(a*delta),Y1+1,n1-Y1)<eta){
        u1 <- qbeta(1-(a*delta),Y1+1,n1-Y1)
        return(u1)
      }else{
        return(eta)
      }
    }else{
      u1 <- qbeta(1-(a/2),Y1+1,n1-Y1)
      u2 <- newtRap_U(u1,Y1,n1,10)
      return(u2)
    }
  }
```

```
}
```

expected length

```
el <- function(n1,p0){
  el1 <- 0
  q0 <- 1-p0
  for (i in 0:n1) {
    if(i!=0 && i!=n1){
      if(lambda!=0){
        Y1 <- i
        u1 <- qbeta(1-(a/2),Y1+1,n1-Y1)
        u2 <- newtRap_U(u1,Y1,n1,10)
        l1 <- qbeta(a/2,Y1,n1-Y1+1)
        l2 <- newtRap_L(l1,Y1,n1,10)
        el1 <- el1 + (choose(n1,i)*p0^i*q0^(n1-i)*(u2-l2))
      }else{
        el1 <- el1 +
          (choose(n1,i)*p0^i*q0^(n1-i)*(u(i,n1,a)-
l(i,n1,a)))
      }
    }else{
      el1 <- el1 + (1-
((a/2)^(1/n1)))*choose(n1,i)*p0^i*q0^(n1-i)
    }
  }
```

```
  return(el1)
}
```

```
el_approx <- function(n1,p0){
  el1 <- 0
  q0 <- 1-p0
  for (i in 0:n1) {
    if(i!=0 && i!=n1){
      Y1 <- i
      u2 <- (i/n1)+(qnorm(a/2,lower.tail =
F)*(1/sqrt(n1))*sqrt((i/n1)*(1-(i/n1))))
      l2 <- (i/n1)-(qnorm(a/2,lower.tail =
F)*(1/sqrt(n1))*sqrt((i/n1)*(1-(i/n1))))
      el1 <- el1 + (choose(n1,i)*p0^i*q0^(n1-i)*(u2-l2))
    }else{
      el1 <- el1 + (1-
((a/2)^(1/n1)))*choose(n1,i)*p0^i*q0^(n1-i)
    }
  }
  return(el1)
}
```

```
el_clop <- function(n1,p0){
  el1 <- 0
  q0 <- 1-p0
  for (i in 0:n1) {
    if(i!=0 && i!=n1){
      Y1 <- i
      u2 <- qbeta(1-(a/2),i+1,n-i)
      l2 <- qbeta(a/2,i,n-i+1)
      el1 <- el1 + (choose(n1,i)*p0^i*q0^(n1-i)*(u2-l2))
    }else{
      el1 <- el1 + (1-
((a/2)^(1/n1)))*choose(n1,i)*p0^i*q0^(n1-i)
    }
  }
  return(el1)}
```

```
### coverage probability ####
cp <- function(n1,p0) {
  cp1 <- 0
  q0 <- 1-p0
  for (i in 0:n1) {
    if(i!=0 & i!=n1){
      Y <- i
      if(p0>=l(Y,n1,a) & p0<=u(Y,n1,a)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }
    }else{
      if(i==0 & p0<=(a/2)^(1/n1)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }else if(i==n1 & p0>=1-(a/2)^(1/n1)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }else{
        cp1 <- cp1 + 0
      }
    }
  }
```

```
  return(cp1)
}
```

```
cp_approx <- function(n1,p0) {
  cp1 <- 0
  q0 <- 1-p0
  for (i in 0:n1) {
    if(i!=0 & i!=n1){
      Y <- i
      l1 <- (i/n1)-(qnorm(a/2,lower.tail =
F)*(1/sqrt(n1))*sqrt((i/n1)*(1-(i/n1))))
      u1 <- (i/n1)+(qnorm(a/2,lower.tail =
F)*(1/sqrt(n1))*sqrt((i/n1)*(1-(i/n1))))
      if(p0>=l1 & p0<=u1){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }
    }else{
      if(i==0 & p0<=(a/2)^(1/n1)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }else if(i==n1 & p0>=1-(a/2)^(1/n1)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }else{
```

```
        cp1 <- cp1 + 0
      }
    }
  }
  return(cp1)
}
```

```
cp_clop <- function(n1,p0) {
  cp1 <- 0
  q0 <- 1-p0
  for (i in 0:n1) {
    if(i!=0 & i!=n1){
      Y <- i
      l1 <- qbeta(a/2,i,n-i+1)
      u1 <- qbeta(1-(a/2),i+1,n-i)
      if(p0>=l1 & p0<=u1){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }
    }else{
      if(i==0 & p0<=(a/2)^(1/n1)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }else if(i==n1 & p0>=1-(a/2)^(1/n1)){
        cp1 <- cp1 + (choose(n1,i)*p0^i*q0^(n1-i))
      }else{
        cp1 <- cp1 + 0
```

```
      }
    }
  }
  return(cp1)
}
```

```
### Calculation ####
### prior ####
prior1 <- 1/6
prior2 <- 1/7776
prior3 <- (prior1+prior2)/2
p_1dadu <- 1/6
p_2dadu <- 4/36
p_3dadu <- 6/216
p_4dadu <- 4/1296
p_5dadu <- 1/7776
p_dadu <- c(p_1dadu,p_2dadu,p_3dadu,p_4dadu,p_5dadu)
### tail function parameter ####
eta <- (1297/15552)
delta <- 0.01
lambda <- 0.1
### sample size determination ####
p_d <- prior3
```

```
# expected length = minimum |prior3-pi|

d <- min(c(abs(p_1dadu-p_d),abs(p_2dadu-p_d),abs(p_3dadu-
p_d),

           abs(p_3dadu-p_d),abs(p_4dadu-p_d),abs(p_5dadu-
p_d)))

# expected length = minimum |pi-pj| i \ne j

d <- min(c(abs(p_1dadu-p_2dadu),abs(p_1dadu-
p_3dadu),abs(p_1dadu-p_4dadu),abs(p_1dadu-p_5dadu),

           abs(p_2dadu-p_3dadu),abs(p_2dadu-
p_4dadu),abs(p_2dadu-p_5dadu),

           abs(p_3dadu-p_4dadu),abs(p_3dadu-p_5dadu),

           abs(p_4dadu-p_5dadu)))
```

aproximate method

```
p0 <- prior3

p0 <- p_1dadu

n_approx <- ceiling((4*qnorm(1-(a/2))^2*p0*(1-p0))/d^2)

n_approx

max_n <- ceiling((4*qnorm(1-(a/2))^2*0.5*(1-0.5))/d^2)

max_n
```

exact procedure

```
#eta <- prior3

eta <- (prior1+prior2)/2

ksi <- (1/100)*2

p0 <- (eta)

solusi_n <- 0
```

```
for (i in 1:max_n) {
  if(abs(el(i,p0)-d)<=ksi){
    solusi_n <- solusi_n + 1
  }
}
solusi_n
S_ksi <- c(1:solusi_n)
```

```
j <- 1
for (i in 1:max_n) {
  if(abs(el(i,p0)-d)<=ksi){
    if(j!=length(S_ksi)){
      S_ksi[j] <- i
      j <- j + 1
    }else{
      S_ksi[j] <- i
    }
  }
}
S_ksi
```

n with minimum coverage

```
n_terbaik <- S_ksi[1]
for (i in 1:length(S_ksi)) {
```

```
  if(cp(S_ksi[i],p0)<=n_terbaik){
    n_terbaik <- S_ksi[i]
  }
}
n_terbaik
```

n minimum

```
n_min <- 0
for (i in 1:max_n) {
  if(abs(el(i,p0)-d)<=ksi){
    n_min <- i
    break
  }
}
n_min
```

1000 simulation

```
p <- (6/216)
n <- n_min # min sample
n <- n_terbaik # min coverage probability
sims_Y <- c(1:1000)
for (j in 1:1000) {
  u <- runif(n)
  x <- as.vector(matrix(0,nrow=n)) # vector of observation
  for (i in 1:n) {
    if(u[i]>=(1-p)){
      x[i]=1
    }
  }
  Y <- (sum(x))
```

```
  sims_Y[j] <- Y
}
sims_Y
### batas bawah ####
sims_L <- c(1:1000)
for (i in 1:1000) {
  sims_L[i] <- l(sims_Y[i],n,a)
}
sims_L
### batas atas ####
sims_U <- c(1:1000)
for (i in 1:1000) {
  sims_U[i] <- u(sims_Y[i],n,a)
}
sims_U
### tabel simulasi
tebakan <- as.vector(matrix(0,ncol=1000))
for (j in 1:1000) {
  dadu <- c(1:length(p_dadu))
  for (i in 1:length(p_dadu)) {
    if(p_dadu[i]>=sims_L[j] & p_dadu[i]<=sims_U[j]){
      dadu[i] <- i
    }else{
      dadu[i] <- 0
    }
  }
  tebakan[j] <- max(dadu)
}
```

```
tebakan_p <- c(1:1000)

for (i in 1:1000) {

  if(p>sims_L[i] & p<sims_U[i]){

    tebakan_p[i] <- 1

  }else{

    tebakan_p[i] <- 0

  }

}

sk_length <- sims_U-sims_L

#tabel2 <-
data.frame(sims_Y,sims_L,sims_U,sk_length,tebakan_p,tebakan)
# delta 0.01 lambda 0

#tabel3 <-
data.frame(sims_Y,sims_L,sims_U,sk_length,tebakan_p,tebakan)
# delta 0 lambda 0

#tabel4 <-
data.frame(sims_Y,sims_L,sims_U,sk_length,tebakan_p,tebakan)
# delta 0.01 lambda 0.1

#tabel5 <-
data.frame(sims_Y,sims_L,sims_U,sk_length,tebakan_p,tebakan)
# delta 0 lambda 0.1

#View(tabel2)

#View(tabel3)

#View(tabel4)

#View(tabel5)
```

jumlah tebakan == i

```
tebakan_benar <- 0

for (i in 1:1000) {

  if(tebakan[i]==4){
```

```
    tebakan_benar <- tebakan_benar+1
  }
}
tebakan_benar
```

confidence belt

```
n <- n_min
nilaiY <- c(0:n)
nilaiY
nilai_l <- c(0:n)
for (i in 1:n+1) {
  nilai_l[i] <- l(nilaiY[i],n,a)
}
nilai_l
```

```
nilai_u <- c(0:n)
for (i in 1:n+1) {
  nilai_u[i] <- u(nilaiY[i],n,a)
}
nilai_u
nilai_u[1] <- u(0,n,a)
```

plot confidence belt

```
k <- n
batas2 <- c(rep('l',(k+1)),rep('u',(k+1)),rep('x',(k+1))) #
k+1
sukses <- c(0:k,0:k,0:k) # k
xbar <- c(sukses/n)
```

```
batas1 <- c(nilai_l[1:(k+1)],nilai_u[1:(k+1)],xbar[1:(k+1)])
# k+1

data1 <- data.frame(sukses,batas1,batas2)

data1

qplot(x = sukses,

      y = batas1,

      data = data1,

      colour = batas2)
```

jarak terhadap x bar

```
mean((nilaiY/n)-nilai_l)

mean(nilai_u-(nilaiY/n))

selisih_terhadap_xbar <- rep(0,(k+1))

for (i in 1:(k+1)) {

  if((xbar[i]-nilai_l[i])<(nilai_u[i]-xbar[i])){

    selisih_terhadap_xbar[i] <- i-1

  }

}

selisih_terhadap_xbar
```

plot confidence belt and normal aprox

```
batas2 <-
c(rep('l',(k+1)),rep('u',(k+1)),rep('x',(k+1)),rep('x',(k+1)
)) # k+1

sukses <- c(0:k,0:k,0:k,0:k)

apox1 <- c((sukses/n)-(qnorm(a/2,lower.tail =
F)*(1/sqrt(n))*sqrt((sukses/n)*(1-(sukses/n)))))

apox2 <- c((sukses/n)+(qnorm(a/2,lower.tail =
F)*(1/sqrt(n))*sqrt((sukses/n)*(1-(sukses/n)))))

batas1 <-
c(nilai_l[1:(k+1)],nilai_u[1:(k+1)],apox1[1:(k+1)],apox2[1:(
k+1)]) # k+1
```

```
data1 <- data.frame(sukses,batas1,batas2)

data1

qplot(x = sukses,

      y = batas1,

      data = data1,

      colour = batas2)
```

perbandingan terhadap interval wald

```
bts_bwh <- rep(0,k)

bts_ats <- rep(0,k)

for (i in 1:(k+1)) {

  if(nilai_l[i]>apox1[i]){

    bts_bwh[i] <- (i-1)

  }

  if(nilai_u[i]<apox2[i]){

    bts_ats[i] <- (i-1)

  }

}

bts_bwh

bts_ats
```

plot confidence belt and clopper-pearson

```
batas2 <-
c(rep('l',(k+1)),rep('u',(k+1)),rep('x',(k+1)),rep('x',(k+1)
)) # k+1

sukses <- c(0:k,0:k,0:k,0:k)

clop1 <- c(qbeta(a/2,sukses,n-sukses+1))

clop2 <- c(qbeta(1-(a/2),sukses+1,n-sukses))

batas1 <-
c(nilai_l[1:(k+1)],nilai_u[1:(k+1)],clop1[1:(k+1)],clop2[1:(
k+1)])
```

```
data1 <- data.frame(sukses,batas1,batas2)

data1


qplot(x = sukses,

      y = batas1,

      data = data1,

      colour = batas2)
```

perbandingan terhadap interval Clopper-Pearson biasa

```
bts_bwh_cp <- rep(0,k)

bts_ats_cp <- rep(0,k)


for (i in 1:(k+1)) {

  if(nilai_l[i]>clop1[i]){

    bts_bwh_cp[i] <- (i-1)

  }

  if(nilai_u[i]<clop2[i]){

    bts_ats_cp[i] <- (i-1)

  }

}

bts_bwh_cp

bts_ats_cp
```

plot el

```
nilai_p <-
c(0.01,0.02,0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.1,


0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18,0.19,0.2,


0.21,0.22,0.23,0.24,0.25,0.26,0.27,0.28,0.29,0.3,
```

```
0.31,0.32,0.33,0.34,0.35,0.36,0.37,0.38,0.39,0.4,

0.41,0.42,0.43,0.44,0.45,0.46,0.47,0.48,0.49,0.5,

0.51,0.52,0.53,0.54,0.55,0.56,0.57,0.58,0.59,0.6,

0.61,0.62,0.63,0.64,0.65,0.66,0.67,0.68,0.69,0.7,

0.71,0.72,0.73,0.74,0.75,0.76,0.77,0.78,0.79,0.8,

0.81,0.82,0.83,0.84,0.85,0.86,0.87,0.88,0.89,0.9,
             0.91,0.92,0.93,0.94,0.95,0.96,0.97,0.98,0.99,


0.01,0.02,0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.1,

0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18,0.19,0.2,

0.21,0.22,0.23,0.24,0.25,0.26,0.27,0.28,0.29,0.3,

0.31,0.32,0.33,0.34,0.35,0.36,0.37,0.38,0.39,0.4,

0.41,0.42,0.43,0.44,0.45,0.46,0.47,0.48,0.49,0.5,

0.51,0.52,0.53,0.54,0.55,0.56,0.57,0.58,0.59,0.6,

0.61,0.62,0.63,0.64,0.65,0.66,0.67,0.68,0.69,0.7,

0.71,0.72,0.73,0.74,0.75,0.76,0.77,0.78,0.79,0.8,

0.81,0.82,0.83,0.84,0.85,0.86,0.87,0.88,0.89,0.9,
             0.91,0.92,0.93,0.94,0.95,0.96,0.97,0.98,0.99,
```

```
0.01,0.02,0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.1,

0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18,0.19,0.2,

0.21,0.22,0.23,0.24,0.25,0.26,0.27,0.28,0.29,0.3,

0.31,0.32,0.33,0.34,0.35,0.36,0.37,0.38,0.39,0.4,

0.41,0.42,0.43,0.44,0.45,0.46,0.47,0.48,0.49,0.5,

0.51,0.52,0.53,0.54,0.55,0.56,0.57,0.58,0.59,0.6,

0.61,0.62,0.63,0.64,0.65,0.66,0.67,0.68,0.69,0.7,

0.71,0.72,0.73,0.74,0.75,0.76,0.77,0.78,0.79,0.8,

0.81,0.82,0.83,0.84,0.85,0.86,0.87,0.88,0.89,0.9,
             0.91,0.92,0.93,0.94,0.95,0.96,0.97,0.98,0.99)
```

```
expected_length2 <- c(1:99,1:99,1:99)
for (i in 1:297) {
  if(i<=99){
    expected_length2[i] <- el(n,nilai_p[i])
  }else if(i>99 & i<=198){
```

```
    expected_length2[i] <- el_approx(n,nilai_p[i])
  }else{
    expected_length2[i] <- el_clop(n,nilai_p[i])
  }
}
label_el2 <- c(1:297)

for (i in 1:297) {
  if(i<=99){
    label_el2[i] <- 't'
  }
  if(i>99 & i<= 198){
    label_el2[i] <- 'a'
  }
  if(i>198 & i<= 297){
    label_el2[i] <- 'c'
  }
}

data3 <- data.frame(nilai_p,expected_length2,label_el2)
data3



qplot(x = nilai_p,
      y = expected_length2,
      data = data3,
      colour = label_el2)
```

```
### perbandingan EL ####
el_kecil1 <- rep(0,297)
for (i in 1:99) {
  if(expected_length2[i]<expected_length2[(i+99)]){
    el_kecil1[i] <- nilai_p[i]
  }
}
el_kecil1
el_kecil2 <- rep(0,297)
for (i in 1:99) {
  if(expected_length2[i]<expected_length2[(i+198)]){
    el_kecil2[i] <- nilai_p[i]
  }
}
el_kecil2
```

```
### plot coverage probability ####
nilai_p <-
c(0.01,0.02,0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.1,
```

```
0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18,0.19,0.2,

0.21,0.22,0.23,0.24,0.25,0.26,0.27,0.28,0.29,0.3,

0.31,0.32,0.33,0.34,0.35,0.36,0.37,0.38,0.39,0.4,

0.41,0.42,0.43,0.44,0.45,0.46,0.47,0.48,0.49,0.5,

0.51,0.52,0.53,0.54,0.55,0.56,0.57,0.58,0.59,0.6,

0.61,0.62,0.63,0.64,0.65,0.66,0.67,0.68,0.69,0.7,

0.71,0.72,0.73,0.74,0.75,0.76,0.77,0.78,0.79,0.8,

0.81,0.82,0.83,0.84,0.85,0.86,0.87,0.88,0.89,0.9,
            0.91,0.92,0.93,0.94,0.95,0.96,0.97,0.98,0.99,


0.01,0.02,0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.1,

0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18,0.19,0.2,

0.21,0.22,0.23,0.24,0.25,0.26,0.27,0.28,0.29,0.3,

0.31,0.32,0.33,0.34,0.35,0.36,0.37,0.38,0.39,0.4,

0.41,0.42,0.43,0.44,0.45,0.46,0.47,0.48,0.49,0.5,

0.51,0.52,0.53,0.54,0.55,0.56,0.57,0.58,0.59,0.6,

0.61,0.62,0.63,0.64,0.65,0.66,0.67,0.68,0.69,0.7,

0.71,0.72,0.73,0.74,0.75,0.76,0.77,0.78,0.79,0.8,
```

```
0.81,0.82,0.83,0.84,0.85,0.86,0.87,0.88,0.89,0.9,
             0.91,0.92,0.93,0.94,0.95,0.96,0.97,0.98,0.99,


0.01,0.02,0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.1,
0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18,0.19,0.2,
0.21,0.22,0.23,0.24,0.25,0.26,0.27,0.28,0.29,0.3,
0.31,0.32,0.33,0.34,0.35,0.36,0.37,0.38,0.39,0.4,
0.41,0.42,0.43,0.44,0.45,0.46,0.47,0.48,0.49,0.5,
0.51,0.52,0.53,0.54,0.55,0.56,0.57,0.58,0.59,0.6,
0.61,0.62,0.63,0.64,0.65,0.66,0.67,0.68,0.69,0.7,
0.71,0.72,0.73,0.74,0.75,0.76,0.77,0.78,0.79,0.8,
0.81,0.82,0.83,0.84,0.85,0.86,0.87,0.88,0.89,0.9,
             0.91,0.92,0.93,0.94,0.95,0.96,0.97,0.98,0.99)




coverage_prob <- c(1:99,1:99,1:99)
```

```
for (i in 1:297) {
  if(i<=99){
    coverage_prob[i] <- cp(n,nilai_p[i])
  }else if(i>99 & i<=198){
    coverage_prob[i] <- cp_approx(n,nilai_p[i])
  }else{
    coverage_prob[i] <- cp_clop(n,nilai_p[i])
  }
}

label_cp <- c(1:297)

for (i in 1:297) {
  if(i<=99){
    label_cp[i] <- 't'
  }
  if(i>99 & i<= 198){
    label_cp[i] <- 'a'
  }
  if(i>198 & i<= 297){
    label_cp[i] <- 'c'
  }
}

data4 <- data.frame(nilai_p,coverage_prob,label_cp)
data4
```

```
qplot(x = nilai_p,
      y = coverage_prob,
      data = data4,
      colour = label_cp)
qplot(x = nilai_p,
      y = coverage_prob,
      data = data4,
      colour = label_cp,
      geom = c('point','line'))
```

histogram simulasi

```
n <- n_min
sukses1 <- c(1:n)
frekuensi <- rep(0,n)
for (i in 1:1000) {
  for (j in 1:n) {
    if(tabel4$sims_Y[i]==sukses1[j]){
      frekuensi[j] <- frekuensi[j]+1
    }
  }
}
frekuensi
ggplot(data=tabel3,aes(x=sims_Y)) + geom_histogram(fill =
'lightblue4',color = 'white')
```