graphs

Bartek Smolibowski March 2024

Sprawdzenie hipotezy: Zwiekszajac n
 mozna oscylowac blisko liczbie $\mathbf{2}$.

Figure 1: Wykres obwodu.

Sprawdzenie hipotezy: Suma wszystkich wektorów wi daje doka
adnie wektor zerowy.

10000	N	X	Υ
30000 -1,25938436058329e-12 -3,83016101473954e-15 40000 -2,04808052850262e-12 4,5382534558982e-15 50000 -2,04080052850262e-12 9,93449029637605e-15 50000 1,9542457657618e-12 1,072262396061101e-15 70000 2,85744639962084e-12 9,22221706353055e-15 90000 3,72444145146953e-12 -6,55366331949597e-15 12000 1,06160707583085e-12 7,12253064687196e-16 13000 6,06395052070926e-12 1,71844689086237e-15 150000 6,3032406050725e-12 1,71844689086237e-15 160000 -3,89417678319316e-12 -3,3351970829497e-14 170000 -6,26896289022266e-12 -1,33519708259-14 120000 3,8831582130774e-12 2,89750956738831e-14 240000 1,27703430093268e-11 2,504703003654e-14 250000 5,907383285603792e-12 1,35641191757833e-15 260000 1,280566567669505e-12 1,379851926e-14 270000 1,805676655518e-11 2,35647030036354e-14 270000 1,8065766655518e-12 1,1775655320636e-15 28000		-4.09731957646416e-13	-1.78228742528375e-14
40000 -2.0854680931322e-12 -5.58253453558982e-15 50000 -2.04808052850262e-12 9.3448029637605e-15 60000 1.9542457657618e-12 1.19644420233207e-15 70000 1.22036700487487e-12 -1.1964420233207e-15 90000 3.72444145146953e-12 -6.55366331949597e-15 110000 5.38263391647993e-12 2.21598726781597e-15 120000 1.06160707583085e-12 7.12253064687196e-16 130000 6.83032406050725e-12 4.40130516667775e-15 160000 5.83939169676935e-12 -1.33519700829497e-14 170000 -2.6896289022266e-12 -4.99082635268068e-14 180000 8.18951463948201e-12 -1.33519700829497e-14 24000 3.48331582130774e-12 2.83750956738831e-14 240000 3.48331582130774e-12 2.88750956738831e-14 250000 6.27672800086456e-12 3.284493929410436e-15 260000 6.2767280008656e-12 2.354493929410436e-15 270000 6.7805256769505e-1 2.876943838806675e-15 280000 5.22766248928718e-12 2.9582538929177e-15 280	20000	8.19362814333603e-13	2.98198965520413e-15
50000 -2.04080052850262e-12 9.93449029637605e-15 50000 1.9542457657618e-12 1.072262399006101e-15 70000 1.22036700487487e-12 1.19644420239207e-15 80000 2.85744639962084e-12 2.9229706353055e-15 90000 3.72444145146953e-12 2.2598726781597e-15 110000 5.3826339164793e-12 2.21598726781597e-15 120000 1.06160707583085e-12 1.71844689086237e-15 140000 3.09447715269455e-12 5.95755541253629e-16 150000 6.83032406050725e-12 1.33519700824949re-14 170000 6.26896289022266e-12 4.4013051666775e-15 170000 6.26896289022266e-12 4.39082635268068e-14 180000 8.189518619316e-12 2.63224297501925e-14 190000 2.420060507792e-12 2.88750986738831e-14 220000 3.8831582130774e-12 2.88750986738831e-14 230000 4.20090595742774e-1 2.98049725412635e-15 250000 5.90783285603792e-12 4.3554419175783-14 260000 2.22766248929718e-12 5.68607889921776e-15 270000	30000	-1.25938436058329e-12	0.00010101110001010
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630000 1.04335142598556 11 1.43701375668673e-14 640000 -1.48275649942721e-11 1.74670594286185e-14 650000 -3.3443511004691e-11 4.02180289668218e-14 660000 9.46675741976491e-12 -1.78699116884644e-14 680000 -2.01490405555973e-11 4.56153296829898e-14 690000 3.27612061198107e-11 -7.4248434820106e-15 7e-05 -7.033154049459899-12 2.98743099485729e-14 700000 -2.20590317069306e-11 -3.44183232262041e-14 730000 -2.58798830217872e-11 3.43482397201483e-14			
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650000 -3.3443511004691e-11 4.02180289668218e-14 660000 9.46675741976491e-12 -1.78699116864644e-14 670000 1.02469254896438e-11 5.9710686373636e-14 680000 2.01490405555973e-11 4.56153296829898e-14 690000 3.27612061198107e-11 -7.4248434820106e-15 7e-05 -7.03315404945989e-12 2.98743099485729e-14 710000 -1.15949267562611e-11 -1.05495378600368e-14 720000 -2.20590317069306e-11 3.44183232262041e-14 730000 -2.58798830217872e-11 3.43482397201483e-14			
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680000 -2.01490405555973e-11 4.56153296829898e-14 690000 327612061198107e-11 -7.4248434820106e-15 7e-05 -7.03315404945989e-12 2.98743009485729e-14 700000 -2.0590317069306e-11 -3.44183232262041e-14 730000 -2.58798830217872e-11 3.43482397201483e-14			
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7e+05 -7.03315404945989e-12 2.98743099485729e-14 710000 -1.15949267562611e-11 -1.05495378600363e-14 720000 -2.20590317069306e-11 -3.44183232262041e-14 730000 -2.58798830217872e-11 3.43482397201483e-14			
710000 -1.15949267562611e-11 -1.05495378600363e-14 720000 -2.20590317069306e-11 -3.44183232262041e-14 730000 -2.58798830217872e-11 3.43482397201483e-14			
720000 -2.20590317069306e-11 -3.44183232262041e-14 730000 -2.58798830217872e-11 3.43482397201483e-14			
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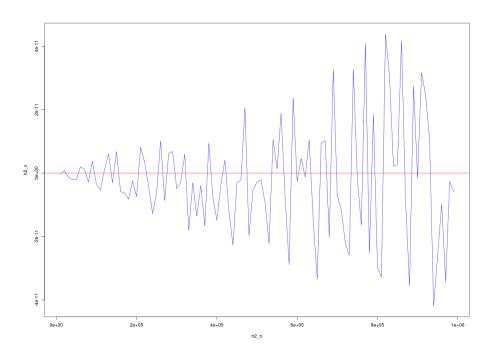


Figure 3: h2 X

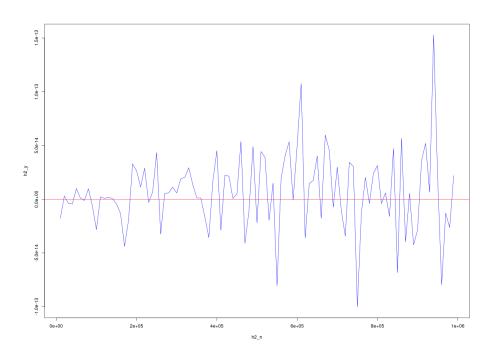


Figure 4: h2 Y

Sprawdzenie hipotezy: Gdzie sume wszystkich wspolrzednych wektorow wi mozna policzyc osobno

N	x	v
1000	-2.1538326677728e-14	1.11022302462516e-15
11000	4.2232883856741e-13	4.44089209850063e-16
21000	9.07718344933528e-13	-9.76996261670138e-15
31000	1.62359015121183e-12	1.55431223447522e-14
41000	1.35891298214119e-12	-1.4210854715202e-14
51000 61000	1.25410792861658e-12 -1.5949463971765e-12	2.22044604925031e-14 -2.44249065417534e-15
71000	8.15791878494565e-13	1.06581410364015e-14
81000	3.68061137123732e-12	-3.10862446895044e-14
91000	4.72155647912587e-12	3.5527136788005e-15
101000	3.43725048423948e-12	-7.99360577730113e-15
111000	-2.41140440948584e-13	-1.99840144432528e-15
121000	-2.29349872427065e-12	1.82076576038526e-14
131000	6.7399419378944e-12	-3.41948691584548e-14
141000 151000	-7.22089055216202e-13 -4.53859172466764e-12	-1.75415237890775e-14 3.70814490224802e-14
161000	-2.30260255307257e-12	4.66293670342566e-15
171000	-7.51843032276156e-13	-8.21565038222616e-15
181000	-5.22470955388599e-12	-1.82076576038526e-14
191000	1.02771124943501e-11	-5.55111512312578e-14
201000	1.7803536422889e-12	-6.66133814775094e-15
211000	8.92885765324536e-12	9.76996261670138e-15
221000	1.1263878718637e-11	-1.77635683940025e-15
231000	-1.10800257857591e-11 -6.91890988946398e-12	1.99840144432528e-14
241000 251000	-6.91890988946398e-12 -4.02744504413022e-12	6.66133814775094e-15 3.48610029732299e-14
261000	-2.48800979818498e-12	-8.43769498715119e-15
271000	-7.97695243193175e-12	7.105427357601e-15
281000	1.36601840949879e-12	3.46389583683049e-14
291000	1.10640385742045e-11	1.33226762955019e-15
301000	1.39448452785018e-11	8.88178419700125e-16
311000	9.47908418424959e-12	-3.99680288865056e-15
321000 331000	2.88569168560571e-12 1.79212200634993e-11	-8.88178419700125e-16 -2.08721928629529e-14
341000	-1.88127291522733e-11	-4.13002965160558e-14
351000	1.62199143005637e-11	6.75015598972095e-14
361000	2.91322521661641e-13	-1.15463194561016e-14
371000	-6.51545484231519e-12	7.32747196252603e-15
381000	1.51629819811205e-11	-1.55431223447522e-14
391000	1.15085718732644e-11	3.10862446895044e-14
401000	1.52073909021055e-11	-4.13002965160558e-14 -3.77475828372553e-14
411000 421000	1.6174617201159e-11 -1.81414883115849e-11	1.79856129989275e-14
431000	-6.14441830748547e-12	-3.86357612569554e-14
441000	1.69975145070111e-11	-5.55111512312578e-14
451000	-1.60969015894352e-11	-1.22124532708767e-14
461000	-1.96442861977175e-11	-6.30606677987089e-14
471000	1.73838721195807e-11	-2.75335310107039e-14
481000	1.70548020150818e-11	-4.35207425653061e-14
491000 501000	-1.83952852950142e-11 -1.44795286871613e-11	-6.97220059464598e-14 -3.70814490224802e-14
511000	-1.44/952868/1613e-11 1.03956843133801e-11	-3.70814490224802e-14 -6.3948846218409e-14
521000	9.85567183420244e-12	-6.88338275267597e-14
531000	-6.82520706618561e-12	-7.105427357601e-15
541000	1.21125331986605e-11	3.64153152077051e-14
551000	-2.69864131041686e-11	3.530509218308e-14
561000	-6.59716725692761e-12	9.2148511043888e-14
571000 581000	-1.18707266238971e-11 -1.5365930750022e-11	-5.39568389967826e-14
591000	-1.5365930750022e-11 2.455369241261e-11	-5.46229728115577e-14 -6.21724893790088e-15
601000	-1.19357856931401e-11	-4.81836792687318e-14
	2.063282877884389511	8.88178419700125e-16
621000	-3.026379147286218-11	6.57252030578093e-14
631000	3.0539570872179e-11	9.76996261670138e-14
641000	3.50786066860564e-11	1.15463194561016e-14
651000	-2.20414797524882e-11	1.19904086659517e-14
661000	5.73363578837416e-12	3.68594044175552e-14
671000 681000	3.60431684498508e-11 2.44839704066635e-11	-2.1316282072803e-14 -8.83737527601625e-14
691000	2.57704968475991e-11	3.01980662698043e-14
701000	3.30846461338297e-11	-2.66453525910038e-15
711000	3.40545369681422e-11	4.44089209850063e-15
70.000	1.22835075444527e-12	4.13002965160558e-14
721000 731000	3.90261156724137e-11	-4.44089209850063e-16

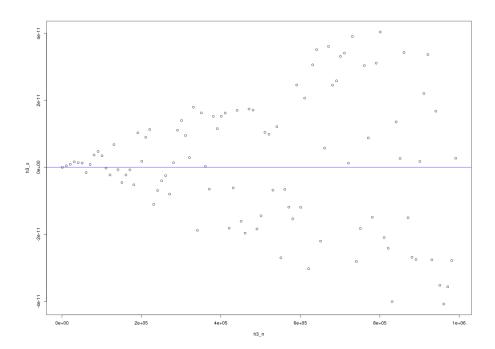


Figure 6: H3x plot .

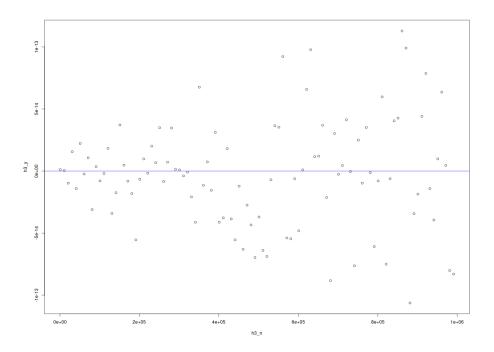


Figure 7: H3 y plot .

Sprawdzenie hipotezy: Opisane zastosowanie metody Monte Carlo jest mniej efektywne niz metoda oparta o sumowanie wektorów

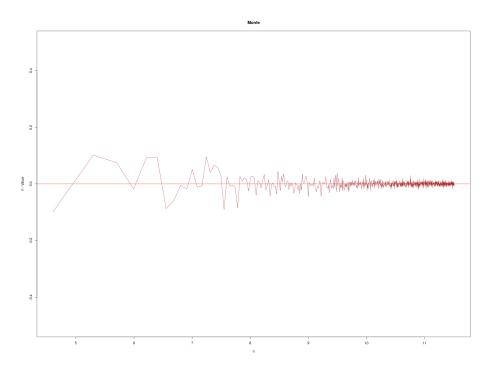


Figure 8: Wykres prob.

5 wektor vs monte carlo

Metoda monte carlo jest mniej efektywna od metody sumowaniu wektorow, monte carlo jest odpowiednia dla duzego "n" gdzie zlozonosc obliczeniowa sumowania wektorow zaczyna byc coraz wieksza.