Funkcja skrótu SHA-3

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Kajetan Harla

Proszę przetestować ciąg złożony z samych zer oraz plik TRNG_P testami statystycznymi NIST.

Następnie proszę obliczyć skrót (SHA-3) dla obu plików w taki sposób by uzyskać niezbędna ilość danych do dalszych testów (minimum 13MB). Wyniki działania funkcji skrótu SHA-3 proszę przetestować testami statystycznymi.

Proszę przygotować program testów tak, aby ciąg wejściowy został podzielony na podciągi o długości 1000_000 bitów (1Mb) i wykonać 100 testów (po jednym dla każdego podciągu).

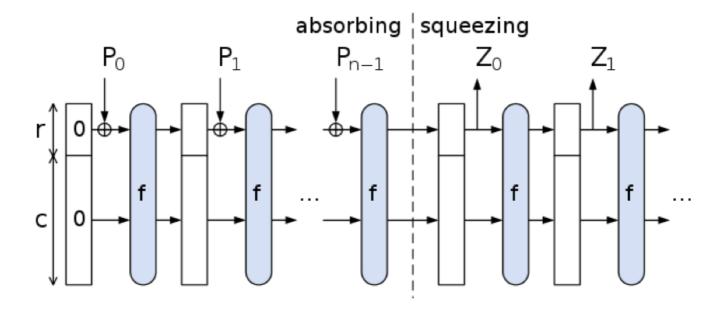
Następnie proszę przedstawić wynik w postaci uśrednionej P-wartości i składnika proporcji obliczonego w następujący sposób R = ilość zdanych testów / 100. (patrz rozdział 4.2.1 NIST SP800-22).

Proszę wyciągnąć wnioski i przygotować raport z wykonanych ćwiczeń.

SHA-3

Algorytm SHA-3 oparty jest na konstrukcji gąbki (sponge construction), która przetwarza dane w dwóch głównych fazach: absorpcji i wyciskania. Centralnym elementem algorytmu jest wewnętrzny stan o rozmiarze 1600 bitów, który dzielony jest na dwie części: bitrate (r) i capacity (c), gdzie r + c = 1600. W fazie absorpcji dane wejściowe są najpierw uzupełniane (paddingiem), tak aby ich długość była wielokrotnością r. Następnie są dzielone na bloki o rozmiarze r bitów, które są kolejno mieszane ze stanem za pomocą operacji XOR. Po każdym dodaniu bloku wykonywana jest permutacja Keccak-f, która przekształca cały stan za pomocą serii operacji logicznych i rotacji.

Permutacja Keccak-f składa się z 24 rund, z których każda obejmuje pięć kroków: theta, rho, pi, chi i iota. Te operacje odpowiadają za mieszanie bitów w różnych częściach stanu, wprowadzając nieliniowość i zapewniając wysoką entropię. Po zakończeniu absorpcji przechodzi się do fazy wyciskania (squeezing), w której wynikowy skrót jest odczytywany ze stanu w porcjach po r bitów. Jeśli wymagany skrót jest dłuższy niż r, wykonywane są kolejne permutacje i pobierane następne fragmenty stanu. Proces wyciskania trwa, aż zostanie uzyskana żądana długość skrótu (np. 256 bitów dla SHA3-256). W odróżnieniu od SHA-2, SHA-3 nie opiera się na dodawaniu modulo ani operacjach arytmetycznych, co czyni go bardziej odpornym na niektóre rodzaje ataków. Cała struktura SHA-3 umożliwia także elastyczne tworzenie skrótów o zmiennej długości oraz zastosowanie w funkcjach typu XOF (np. SHAKE).



Wyniki dla TRNG_P.bit:

- ustawienia testu:
 - o 100 bitstreams
 - o length: 1000_000

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TEST												
9	12	8	13	9	7	10	10	13	9	0.924076	99/100	Frequency
10	9	7	9	11	7	13	10	8	16	0.637119	100/100	
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9	14	10	6	11	13	6	10	7	14	0.494392	99/100	
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8	15	6	10	7	6	10	9	9	20	0.045675	98/100	
Cumu	lati	veSu	ms									
13	12	13	10	12	10	8	7	10	5	0.699313	100/100	Runs
10	12	7	9	18	10	9	7	12	6	0.289667	99/100	
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7	15	13	5	12	6	10	12	9	11	0.401199	100/100	FFT
12	11	11	8	12	0	10	16	9	11	0.085587	100/100	
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10 11 16 11 7 16	7	7	5	10	0.181557	98/100
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14 8 13 10 10 7	10	8	15	5	0.419021	99/100
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11 8 7 12 13 9	11	7	7	15	0.616305	98/100
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4 8 12 14 10 10	10	9	11	12	0.678686	99/100
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6 10 12 16 8 10	9	11	12	6	0.514124	98/100
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5 9 10 7 5 8	8	15	18	15	0.032923	99/100
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10 10 7 12 6 13 NonOverlappingTemplate	7	11	12	12	0.779188	99/100
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7 14 5 10 8 11 NonOverlappingTemplate	10	13	10	12	0.657933	100/100
11 10 7 8 6 11 NonOverlappingTemplate	15	10	13	9	0.678686	99/100
8 6 9 16 6 8	12	16	5	14	0.071177	99/100
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7 6 13 10 9 16	10	7	12	10	0.494392	98/100
NonOverlappingTemplate 14 8 5 12 10 8	14	10	11	8	0.595549	98/100
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15 12 4 15 9 7 NonOverlappingTemplate	7	12	9	10	0.249284	99/100
10 12 10 7 12 12 NonOverlappingTemplate	4	12	13	8	0.595549	99/100
8 13 17 10 11 8	10	8	6	9	0.455937	98/100
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8 9 11 6 14 9	13	12	8	10	0.779188	99/100
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10 14 7 9 12 9	10	6	9	14	0.699313	100/100
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8 12 11 13 10 4 NonOverlappingTemplate	11	6	12	13	0.494392	99/100
9 10 9 9 14 6 NonOverlappingTemplate	15	10	5	13	0.401199	100/100
11 12 6 12 4 9 NonOverlappingTemplate	12	16	3	15	0.040108	100/100
8 6 8 13 13 13 NonOverlappingTemplate	7	10	11	11	0.719747	99/100
11 11 7 9 9 14 NonOverlappingTemplate	8	7	14	10	0.759756	100/100
11 9 9 10 9 12 NonOverlappingTemplate	14	11	3	12	0.554420	99/100
7 14 12 13 10 7 NonOverlappingTemplate	8	10	12	7	0.699313	100/100
10 7 11 11 8 11 NonOverlappingTemplate	9	11	15	7	0.816537	99/100
6 18 6 16 9 14 NonOverlappingTemplate	6	8	5	12	0.019188	100/100
15 14 11 9 11 7 NonOverlappingTemplate	6	11	10	6	0.474986	98/100
11 8 19 4 8 8 NonOverlappingTemplate	12	6	11	13	0.066882	100/100
12 11 11 8 12 0 NonOverlappingTemplate	10	15	10	11	0.122325	100/100
10 11 9 6 10 5 NonOverlappingTemplate	8	12	18	11	0.236810	100/100
16 10 8 9 13 10 NonOverlappingTemplate	12	6	7	9	0.534146	96/100
12 6 11 13 11 11 NonOverlappingTemplate	3	8	15	10	0.275709	99/100
9 5 16 9 6 12 NonOverlappingTemplate	7	11	15	10	0.224821	99/100
17 14 4 11 8 7 NonOverlappingTemplate	11	11	9	8	0.202268	100/100
11 7 9 7 13 8 NonOverlappingTemplate	12	11	14	8	0.759756	99/100
7 9 11 14 5 7 NonOverlappingTemplate	10	15	11	11	0.455937	98/100
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13 8 10 14 6 13	14	6	10	6	0.334538	99/100
NonOverlappingTemplate 8 6 10 13 14 8	12	9	7	13	0.616305	99/100
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9 10 6 14 6 11 NonOverlappingTemplate	11	9	17	7	0.275709	99/100
11 13 15 5 9 15 NonOverlappingTemplate	10	7	8	7	0.289667	100/100
9 10 9 12 14 7 NonOverlappingTemplate	7	10	8	14	0.739918	99/100
9 8 19 10 10 13 NonOverlappingTemplate	9	3	10	9	0.102526	100/100
12 8 10 14 11 8 NonOverlappingTemplate	11	11	6	9	0.851383	100/100
10 7 18 7 5 11 NonOverlappingTemplate	11	15	11	5	0.066882	99/100
7 12 8 12 11 15 NonOverlappingTemplate	12	8	5	10	0.534146	97/100
9 9 4 13 7 7 NonOverlappingTemplate	10	15	12	14	0.275709	99/100
8 11 11 12 20 8 NonOverlappingTemplate	4	8	14	4	0.014550	99/100
11 8 6 7 11 12 NonOverlappingTemplate	8	13	14	10	0.699313	97/100
10 12 12 5 10 9 NonOverlappingTemplate	12	11	10	9	0.911413	98/100
9 11 10 12 9 12 NonOverlappingTemplate	7	10	12	8	0.971699	100/100
8 12 12 9 3 12 NonOverlappingTemplate	15	8	10	11	0.383827	99/100
13 6 9 12 12 11 NonOverlappingTemplate	8	9	13	7	0.759756	98/100
4 15 10 7 15 9 NonOverlappingTemplate	10	7	6	17	0.048716	99/100
11 8 6 17 5 12 NonOverlappingTemplate	10	10	9	12	0.319084	97/100
11 9 8 12 12 2 NonOverlappingTemplate	7	16	9	14	0.122325	98/100
7 10 11 9 12 8 NonOverlappingTemplate	11	15	9	8	0.834308	100/100
8 14 9 13 12 8 NonOverlappingTemplate	5	11	12	8	0.616305	100/100
4 12 13 9 13 7 NonOverlappingTemplate	5	13	7	17	0.066882	100/100
8 10 12 10 9 12 NonOverlappingTemplate	10	9	11	9	0.996335	99/100
9 6 10 8 12 10 NonOverlappingTemplate	13	16	8	8	0.554420	99/100
11 10 8 7 13 10 NonOverlappingTemplate	9	10	11	11	0.978072	98/100

11 14 11 8 9 4	9	13	10	11	0.637119	98/100
NonOverlappingTemplate 11 12 11 8 9 9	10	10	12	8	0.991468	98/100
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NonOverlappingTemplate 11 10 12 5 8 12	8	13	9	12	0.779188	100/100
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NonOverlappingTemplate 8 6 7 15 11 14	10	8	12	9	0.534146	98/100
NonOverlappingTemplate 14 13 9 5 4 9	9	13	14	10	0.249284	99/100
NonOverlappingTemplate 9 7 9 9 12 12 NonOverlappingTemplate	10	13	8	11	0.946308	98/100
NonOverlappingTemplate 11 14 15 4 12 12 NonOverlappingTemplate	7	8	10	7	0.289667	97/100
14 12 12 12 6 4 NonOverlappingTemplate	12	1	15	12	0.021999	98/100
6 14 12 9 15 12 NonOverlappingTemplate	5	12	7	8	0.289667	99/100
11 13 16 8 7 6 NonOverlappingTemplate	11	8	9	11	0.514124	99/100
9 7 11 9 13 14 NonOverlappingTemplate	11	5	7	14	0.455937	100/100
10 9 8 9 8 12 NonOverlappingTemplate	9	8	13	14	0.883171	100/100
9 8 12 11 8 14 NonOverlappingTemplate	10	7	8	13	0.816537	100/100
9 8 5 7 6 15 NonOverlappingTemplate	10	10	15	15	0.162606	99/100
13 9 10 9 11 13 NonOverlappingTemplate	12	7	8	8	0.897763	98/100
11 10 15 14 12 9 NonOverlappingTemplate	9	5	6	9	0.437274	98/100
9 12 6 10 15 12 NonOverlappingTemplate	9	4	12	11	0.419021	99/100
16 10 9 8 11 6 NonOverlappingTemplate	8	6	12	14	0.366918	99/100
13 7 8 9 12 12 NonOverlappingTemplate	9	10	8	12	0.911413	99/100
11 10 7 14 9 7 NonOverlappingTemplate	11	9	14	8	0.759756	99/100
13 11 15 7 10 10 NonOverlappingTemplate	6	13	8	7	0.514124	97/100
11 5 14 8 10 11 NonOverlappingTemplate	9	7	18	7	0.162606	98/100
7 6 19 11 7 5 NonOverlappingTemplate	9	11	9	16	0.035174	100/100
10 9 8 12 13 9 NonOverlappingTemplate	6	10	9	14	0.816537	98/100
6 14 13 9 6 12 NonOverlappingTemplate	12	9	10	9	0.657933	100/100

9 10 8 11 9 10	14	6	15	8	0.657933	98/100	
NonOverlappingTemplate 13 8 11 11 9 6	15	5	10	12	0.474986	99/100	
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13 8 7 12 14 10	10	10	10	6	0.759756	99/100	
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6 13 7 12 6 18	8	8	11	11	0.171867	99/100	
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12 7 9 8 9 13 NonOverlappingTemplate	6	8	15	13	0.514124	98/100	
6 10 14 14 9 7	9	6	15	10	0.350485	100/100	
NonOverlappingTemplate	,	Ü	13	10	01330103	1007 100	
7 11 13 9 13 15	9	9	4	10	0.419021	100/100	
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7 9 11 10 14 17	5	4	12	11	0.115387	99/100	
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11 8 10 13 9 7 NonOverlappingTemplate	13	5	9	15	0.494392	99/100	
12 5 8 11 12 7	12	13	12	8	0.657933	100/100	
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11 8 19 4 8 8	12	6	11	13	0.066882	100/100	
NonOverlappingTemplate							
12 10 10 11 11 11	10	8	8	9	0.996335	99/100	
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10 7 12 6 13 9 16 7 14 6 6 18		9	8 7		0.719747	99/100	Universal
16 7 14 6 6 18 ApproximateEntropy	3	13	/	10	0.007694	97/100	
6 8 6 4 6 4	5	5	6	5	0.964295	54/55	
RandomExcursions					0100120	0 1, 00	
6 6 3 7 2 7	5	11	3	5	0.181557	55/55	
RandomExcursions							
	3	5	7	6	0.595549	55/55	
RandomExcursions	_	_	0	4	0.07763	FF /FF	
4 5 5 8 5 6 RandomExcursions	5	5	8	4	0.897763	55/55	
	7	3	9	5	0.181557	55/55	
RandomExcursions						,	
8 6 6 7 6 4	4	6	5	3	0.867692	54/55	
RandomExcursions							
6 7 7 3 3 4	5	7	9	4	0.554420	53/55	
RandomExcursions	1	5	_	4	0 202260	FF /FF	
7 5 6 4 3 12 RandomExcursions	4	Э	5	4	0.202268	55/55	
5 8 8 8 7 6	2	4	4	3	0.401199	54/55	
RandomExcursionsVariant		-				.,	
6 4 9 8 10 5	5	3	4	1	0.102526	55/55	
RandomExcursionsVariant							
5 6 6 9 8 7	3	6	3	2	0.366918	55/55	
RandomExcursionsVariant 8 5 5 9 8 5	3	3	5	4	0.474986	54/55	
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9 5 6 7 4 4	4	5	6	5	0.834308	54/55	
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6 5 8 5 7 6	5	4	5	4	0.946308	55/55	

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3	9	9	6	6	5	4	5	6	2	0.366918	54/55		
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5	3	8	9	8	8	5	2	2	5	0.162606	54/55		
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			ions										
6	7	5	3	5	3	12	7	4	3	0.115387	55/55		
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-	7	_	_	-		4	7	3	3	0.249284	55/55		
			ions				_						
4	10	6	8	6	5	4	3	4	5	0.474986	55/55		
			ions			_		_					
	7			6	7	7	1	2	6	0.275709	55/55		
			ions			_			_				
4	9	7	7	4	5	3	4	7	5	0.637119	55/55		
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3		7		6	1	5	7	4	4	0.162606	55/55		
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5	3	10	. 9	3	4	4	6	1	10	0.028817	55/55		
			ions			_		_	_				
6		7		2	4	6	4	8	5	0.275709	55/55		
			ions				_	_	_				
5	4	7	. 8	6	2	9	7	2	5	0.304126	55/55		
Rand									_				
13		1	10	8	22	2	11	12	7		97/100	Serial	
9	9	14	12	10	8	9	9	10	10	0.971699	99/100	Serial	
11	11	9	12	12	8	8	8	11	10	0.983453	99/100		
Line	arCo	mple	xity										

_ _ _ _

The minimum pass rate for each statistical test with the exception of the random excursion (variant) test is approximately = 96 for a sample size = 100 binary sequences.

The minimum pass rate for the random excursion (variant) test is approximately = 52 for a sample size = 55 binary sequences.

For further guidelines construct a probability table using the MAPLE program $\,$

provided in the addendum section of the documentation.

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Wyniki dla zeros.bit

- plik składa się z samych zer binarnych
- plik 143 MB
- ustawienia testu:

- o 100 bitstreams
- o length: 1000_000

SEQU			THE 	UNIF	ORMI	TY 0	F P-	VALI	JES A	ND THE PRO)P0R	TION OF	PAS	SING
g	ener 	ator 	is 	<dat< th=""><th>a/ze </th><th>ros.</th><th>bit></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></dat<>	a/ze 	ros.	bit>							
C1 TEST		С3	C4	C5	C6	C7	C8	C9	C10	P-VALUE	PR0	PORTION	ST	ATISTICAL
100				0		0								Frequency
100				0	0	0	0	0	0	0.000000	*	0/100	*	
Bloc		-	-	•	0	•	_	_	0	0.00000		0./4.00		
	0		0	0	0	0	0	0	0	0.000000	*	0/100	*	
Cumu				0	0	0	0	Ω	0	0 000000	ماد	0/100	sk	
100 Cumu		0 vasu	0 mc	0	Ø	Ø	0	0	V	0.000000	*	0/100	*	
100				0	0	0	0	0	ρ	0.000000	*	0/100	Ψ	Runs
100				0	0	0	0	0		0.000000		*		INUITS
Long			J	J	J	J	9	U	U	0100000	-1*	0/100	-11	
100			0	0	0	0	0	0	0	0.000000	*	0/100	*	Rank
100				0	0	0	0	0		0.000000		*		
100		0		0	0	0	0	0		0.000000		-		
Non0		appi	ngTe	mpla	te									
			0		0	0	0	0	0	0.000000	*	0/100	*	
Non0	verl	appi	ngTe	mpla	te									
100	0	0	0	•	0	0	0	0	0	0.000000	*	0/100	*	
Non0	verl	appi	ngTe	mpla	te									
100	0	0	0		0	0	0	0	0	0.000000	*	0/100	*	
Non0	verl	appi	ngTe	mpla	te									
100	0	0	0	0	0	0	0	0	0	0.000000	*	0/100	*	
Non0			_											
100					0	0	0	0	0	0.000000	*	0/100	*	
Non0			_				_		_	0.00000		0.44.5.5		
100	0	0	0	0	0	0	0	0	0	0.000000	*	0/100	*	
Non0			_			0	0		0	0.00000	.1	0/100		
100	0	0 200 i	0 naTo	0 mnla	0	0	0	0	0	0.000000	*	0/100	*	
Non0 ¹ 100		appı 0	ng re 0	mp ta 0		0	0	0	0	0 000000	V	0/100	sla	
Non0					0	V	V	U	Ø	0.000000	*	0/100	*	
100		appı	ng re	шр са 0	0	0	0	0	0	0.000000	*	0/100	*	
Non0						U	V	U	U	0.000000	71	0/ 100	ጥ	
100	ver c	аррт аррт	0	111p ca	0	0	0	0	0	0.000000	*	0/100	*	
Non0						J	0	U	0	0100000		J/ 100	.,,	
100	0	аррт	0	111p ca	0	0	0	0	0	0.000000	*	0/100	*	
-50	0	0	0	0	0	0	0	U	U	0.00000		0/ 100		

100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0 000000	.1.	0/100	de
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	•						0./4.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
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100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	V	V	V	U	0.000000	~	0/100	Τ
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate							,	
100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	•	•	0	0 000000		0./4.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	sle.	0/100	ale.
NonOverlappingTemplate	V	U	V	U	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	0	O	0	01000000	*1*	0/100	71
100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate					0.00000		0.46.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								

100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0 000000	.1.	0/100	de
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NonOverlappingTemplate	•						0./4.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	V	V	V	U	0.000000	~	0/100	Τ
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	sle.	0/100	ale.
NonOverlappingTemplate	V	U	V	U	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	0	O	0	01000000	*1*	0/100	71
100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate					0.00000		0.46.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								

100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0 000000	.1.	0/100	de
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	•						0./4.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
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NonOverlappingTemplate	V	V	V	U	0.000000	~	0/100	Τ
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	sle.	0/100	ale.
NonOverlappingTemplate	V	U	V	U	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	0	O	0	01000000	*1*	0/100	71
100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate					0.00000		0.46.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0 000000	.1.	0/100	de
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	•						0./4.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	V	V	V	U	0.000000	~	0/100	Τ
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate	0	•	•	0	0 000000		0./4.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	sle.	0/100	ale.
NonOverlappingTemplate	V	U	V	U	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	0	O	0	01000000	*1*	0/100	71
100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate					0.00000		0.46.00	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								

100 0 0 0 0 0	0	0	0	0	0.000000 *	0/100	*
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NonOverlappingTemplate	0	•	0	0	0.00000	0./100	
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000 *	0/100	*
NonOverlappingTemplate	0	Ü	O	Ü	01000000 A	0/ 100	71
100 0 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000 *	0/100	*
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NonOverlappingTemplate	0	0	0	0	0.000000	0./100	
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000 *	0/100	*
NonOverlappingTemplate	0	Ü	O	Ü	01000000 A	0/ 100	71
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NonOverlappingTemplate	0	0	0	0	0.000000	0./100	
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Monover tapping remptate							

100										
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100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0	0	0.000000	*	0/100	*	
100	<pre>0verlappingTemplate</pre>									
ApproximateEntropy 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*	Universal
RandomExcursions 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*	
RandomExcursions 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ApproximateEntropy									
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Wyniki dla TRNG_P_sha3.bit

- plik 128 MB (tak jak plik TRNG_P)
- hash utworzony w skali 1:1
- ustawienia testu:
 - o 100 bitstreams
 - o length: 1000_000

 RESUL			THE	UNIF	 ORMI	TY 0	 F P-	VALU	JES A	ND THE PRO	DPORTION OF	PASSING	
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C1 TEST	C2	C3	C4	C5	C6	C7	C8	C9	C10	P-VALUE	PROPORTION	STATISTICAL	
5	12	11	7	8	13	9	10	15	10	0.554420	100/100	Frequency	
11	8	13	16	7	9	13	6	8	9	0.437274	99/100		
Block	ĸFre	quen	су										
7	9	8	9	12	6	13	12	8	16	0.455937	100/100		

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3 11 17 8 7 7	6	16	12	13	0.028817	99/100	
CumulativeSums	_	4.0				4.00 /4.00	_
10 15 14 11 5 12	7	12	8	6	0.319084		Runs
14 11 9 14 12 10	10	11	6	3	0.319084	99/100	
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10 11 15 8 5 8	14	8	13	8	0.419021	100/100	Rank
9 12 12 8 8 12	11	12	8	8	0.946308		FFT
7 9 10 7 5 12	11	15	14	10	0.437274	99/100	
NonOverlappingTemplate							
11 7 14 7 10 3	10	15	14	9	0.181557	99/100	
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8 5 9 12 14 9	7	12	14	10	0.534146	98/100	
NonOverlappingTemplate							
12 9 12 10 6 4	10	11	12	14	0.514124	99/100	
NonOverlappingTemplate							
6 11 13 18 6 8	17	8	7	6	0.026948	100/100	
NonOverlappingTemplate							
3 12 12 12 12 11	7	11	6	14	0.289667	100/100	
NonOverlappingTemplate							
14 9 11 9 9 7	13	10	11	7	0.851383	97/100	
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3 8 5 9 8 15	18	8	14	12	0.020548	100/100	
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6 7 8 11 16 13	11	11	10	7	0.474986	100/100	
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11 8 7 9 13 8	12	12	11	9	0.924076	98/100	
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9 12 9 16 1 7	11	10	10	15	0.071177	99/100	
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11 13 11 10 4 11	9	12	10	9	0.798139	99/100	
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7 10 19 9 7 14	11	8	7	Q	0.145326	99/100	
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6 11 11 8 17 10	17	5	2	12	0.019188	100/100	
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	10	10	9	0	0.739918	100/100	
NonOverlappingTemplate	10	4	0	12	0 202027	100/100	
9 9 14 10 8 15	10	4	8	13	0.383827	100/100	
NonOverlappingTemplate	0	10	12	0	0 071600	07/100	
	8	10	13	9	0.971699	97/100	
NonOverlappingTemplate		_					
12 6 8 13 9 14	9	8	13	8	0.657933	100/100	
NonOverlappingTemplate	_						
14 4 6 8 13 13	9	7	14	12	0.213309	98/100	
NonOverlappingTemplate							
8 9 7 13 10 14	7	9	13	10	0.759756	97/100	
NonOverlappingTemplate							
11 16 10 9 9 7	10	7	12	9	0.719747	100/100	
NonOverlappingTemplate							
9 11 8 13 10 6	12	14	10	7	0.739918	100/100	
NonOverlappingTemplate							
6 10 9 9 10 12	12	7	13	12	0.851383	100/100	
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10 7 8 11 11 11 NanOverlanningTemplate	9	9	11	13	0.971699	100/100
NonOverlappingTemplate 7 8 11 9 10 12	13	12	7	11	0.897763	100/100
	7	11	11	11	0.595549	96/100
NonOverlappingTemplate 12 8 8 16 11 10	10	13	5	7	0.419021	97/100
NonOverlappingTemplate 14 13 4 9 12 9	8	11	7	13	0.437274	99/100
NonOverlappingTemplate 11 8 9 7 11 10	10	14	12	8	0.911413	98/100
NonOverlappingTemplate 12 15 11 6 9 8	10	8	8	13	0.657933	100/100
	9	12	12	11	0.779188	100/100
NonOverlappingTemplate 8 9 8 13 15 9	9	5	9	15	0.383827	99/100
NonOverlappingTemplate 10 10 7 13 15 13	4	11	12	5	0.224821	98/100
NonOverlappingTemplate 8 12 11 15 7 15 NonOverlappingTemplate	5	9	11	7	0.319084	100/100
NonOverlappingTemplate 9 10 14 10 6 7 NonOverlappingTemplate	12	15	5	12	0.350485	100/100
10 7 8 12 8 17 NonOverlappingTemplate	9	8	13	8	0.455937	99/100
12 13 10 10 9 5 NonOverlappingTemplate	9	13	12	7	0.719747	99/100
10 13 7 9 12 9 NonOverlappingTemplate	11	9	9	11	0.971699	99/100
12 12 7 11 9 8 NonOverlappingTemplate	11	13	9	8	0.924076	99/100
6 10 10 10 13 16 NonOverlappingTemplate	10	5	11	9	0.455937	100/100
6 7 10 9 10 13 NonOverlappingTemplate	17	11	8	9	0.437274	100/100
12 8 8 11 7 12 NonOverlappingTemplate	13	9	13	7	0.798139	100/100
12 13 6 12 14 4 NonOverlappingTemplate	15	7	7	10	0.171867	99/100
12 6 9 7 14 10 NonOverlappingTemplate	14	8	12	8	0.595549	99/100
3 5 14 13 9 10 NonOverlappingTemplate	14	15	11	6	0.071177	100/100
8 15 15 5 9 12 NonOverlappingTemplate	8	8	10	10	0.419021	100/100
10 7 7 10 6 8 NonOverlappingTemplate	16	10	9	17	0.191687	99/100
5 8 13 11 13 8 NonOverlappingTemplate	12	13	9	8	0.637119	99/100
15 11 10 5 13 5 NonOverlappingTemplate	13	14	5	9	0.137282	98/100
11 13 5 9 9 10 NonOverlappingTemplate	7	11	12	13	0.739918	100/100

13 6 6 9 14 10	11	10	13	8	0.616305	100/100
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11 10 8 10 7 13	11	8	11	11	0.964295	97/100
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12 6 8 5 12 12	19	11	9	6	0.075719	98/100
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NonOverlappingTemplate	10	11	10	13	0.739730	100/100
10 6 12 9 5 9	10	12	15	12	0.534146	99/100
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11 10 7 11 6 9	10	10	17	9	0.554420	98/100
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5 11 13 7 10 10 NonOverlappingTemplate	13	9	12	10	0.759756	100/100
4 9 11 8 15 13	12	9	11	8	0.474986	100/100
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8 9 4 14 14 8	10	11	10	12	0.514124	99/100
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13 11 8 7 11 8	14	8	7	13	0.678686	99/100
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7 12 8 10 12 5	14	13	10	9	0.616305	98/100
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11 12 7 9 11 12	6	9	13	10	0.867692	99/100
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4 9 8 10 13 13	12	10	9	12	0.657933	99/100
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7 14 8 17 7 10	7	8	10	12	0.319084	99/100
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12 11 6 7 10 7	11	11	18	7	0.249284	100/100
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8 7 11 10 12 9	10	12	13	8	0.935716	100/100
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9 12 8 12 9 10	8	9	5	18	0.289667	99/100
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7 9 10 7 5 12	11	15	14	10	0.437274	99/100
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8 8 9 5 15 12	8	9	14	12	0.455937	99/100
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13 12 11 12 7 5	8	8	15	9	0.474986	99/100
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NonOverlappingTemplate	9	10	10	14	0.955/10	90/100
13 11 8 11 12 13	7	9	5	11	0.699313	98/100
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6 9 11 7 8 9	8	11	20	11	0.129620	99/100
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9 15 11 7 17 11	5	8	10	7	0.191687	100/100
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3 12 9 13 11 10	9	11	11	11	0.657933	100/100
NonOverlappingTemplate 12 9 7 10 9 10	10	11	10	12	0.991468	100/100
NonOverlappingTemplate	10		10	12	01331400	100/100
5 17 11 13 11 10	6	9	8	10	0.304126	99/100
NonOverlappingTemplate						
12 8 10 12 6 13	8	11	11	9	0.883171	99/100
NonOverlappingTemplate						
12 14 10 6 8 10	12	14	11	3	0.275709	99/100
NonOverlappingTemplate 5 9 13 15 12 5	12	10	6	12	0.224821	99/100
NonOverlappingTemplate	12	10	U	13	0.224021	99/100
10 9 7 17 8 13	9	10	7	10	0.514124	99/100
NonOverlappingTemplate						
7 15 12 12 7 6	8	16	9	8	0.262249	99/100
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5 9 14 10 9 12	11	8	9	13	0.719747	99/100
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15 9 15 8 7 7 NonOverlappingTemplate	8	5	12	14	0.202268	99/100
11 14 5 11 11 13	8	15	5	7	0.236810	99/100
NonOverlappingTemplate	Ü	13	9	,	0.250010	33, 100
11 8 6 14 5 6	15	13	16	6	0.058984	100/100
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8 12 9 10 12 13	5	9	14	8	0.657933	100/100
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10 12 8 10 16 10 NonOverlappingTemplate	12	/	9	О	0.595549	100/100
9 10 5 13 10 11	14	9	9	10	0.798139	99/100
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12 11 7 13 6 6	16	3	14	12	0.066882	98/100
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12 12 4 10 13 15	10	6	12	6	0.249284	100/100
NonOverlappingTemplate	4.0	4.0	_	4.0	0 40 4000	100/400
8 8 11 12 6 9	13	10	/	16	0.494392	100/100
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NonOverlappingTemplate	,	,	0	0	31 13 13 JZ	57, 100
9 8 13 12 6 12	7	13	12	8	0.699313	99/100
NonOverlappingTemplate						
9 9 19 12 6 8	7	5	15	10	0.055361	99/100
NonOverlappingTemplate	_	10	_	4.5	0 055364	00/400
17 12 8 14 5 7	/	10	5	15	0.055361	99/100
NonOverlappingTemplate						

11 7 11 11 8 12 NonOverlappingTemplate	10	13	8	9	0.946308	100/100
12 7 12 16 11 7	7	10	8	10	0.574903	98/100
NonOverlappingTemplate 9 13 9 5 9 16	6	11	13	9	0.350485	99/100
NonOverlappingTemplate 13 11 8 8 13 13	10	9	4	11	0.595549	99/100
NonOverlappingTemplate 10 6 12 13 6 6	13	11	8	15	0.350485	100/100
NonOverlappingTemplate						
11 8 11 11 10 10 NonOverlappingTemplate	12	8	11	8	0.991468	99/100
13 10 8 12 9 11 NonOverlappingTemplate	7	12	7	11	0.897763	98/100
9 6 13 13 10 9	13	7	9	11	0.779188	99/100
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NonOverlappingTemplate 10 20 11 9 10 5	9	7	5	14	0.037566	100/100
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10 8 11 12 9 13 NonOverlappingTemplate	9	4	13	11	0.678686	100/100
14 8 6 5 10 13	8	10	18	8	0.115387	100/100
NonOverlappingTemplate 10 8 3 9 13 10	10	13	10	14	0.455937	100/100
NonOverlappingTemplate 11 7 8 17 7 8	6	7	20	9	0.016717	99/100
NonOverlappingTemplate 7 14 10 6 8 11						
NonOverlappingTemplate						•
10 7 12 6 13 14 NonOverlappingTemplate	11	8	7	12	0.616305	100/100
9 15 9 7 12 5 NonOverlappingTemplate	6	14	14	9	0.249284	99/100
10 11 13 11 9 11	6	9	7	13	0.851383	98/100
NonOverlappingTemplate 11 11 5 11 12 7	15	9	10	9	0.657933	99/100
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8 12 8 12 10 12 NonOverlappingTemplate		8			0.924076	
11 6 12 16 9 8 NonOverlappingTemplate	8	11	7	12	0.534146	100/100
8 11 11 9 12 8 NonOverlappingTemplate	12	6	8	15	0.699313	100/100
11 10 7 11 12 7	8	16	13	5	0.366918	100/100
NonOverlappingTemplate 8 7 15 7 7 16	11	11	8	10	0.366918	99/100
NonOverlappingTemplate						

11	8 6	8	14	11	9	10	14	9	0.739918	99/100	
7		9	9	17	11	10	6	6	0.275709	100/100	
4	verlappi 9 9	8	10	18	8	12	14	8	0.145326	100/100	
6	verlappi 8 8	9	10	13	11	13	10	12	0.851383	100/100	
12	verlappi 13 13	11	8	6	6	15	7	9	0.401199	99/100	
7	verlappi 10 7	14	12	12	11	4	17	6	0.108791	99/100	
8	verlappi 6 6	11	9	10	19	14	12	5	0.058984	100/100	
16		7	8	15	11	7	12	4	0.181557	99/100	
13	verlappi 6 8	10	11	10	10	14	10	8	0.834308	99/100	
6		10	4	12	16	15	14	7	0.071177	100/100	
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19	verlappi 15 11	10	12	11	8	4	4	6	0.015598	97/100	
12		11	10	10	7	9	5	23	0.004629	100/100	
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	verlappi 13 13				11	15	11	9	0.075719	98/100	
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5	oximateE 5 4	9	3	7	4	11	3	9	0.213309	60/60	
8	omExcurs 3 7	6	3	3	7	12	5	6	0.232760	58/60	
6	omExcurs 5 3	4	6	7	7	8	9	5	0.834308	60/60	
6	omExcurs 7 8	5	7	4	7	5	4	7	0.964295	60/60	
7	omExcurs 2 4	8	9	7	6	3	6	8	0.534146	60/60	
4		3	4	5	6	10	7	9	0.602458	60/60	
4	•	5	10	1	7	10	8	3	0.122325	60/60	
	omExcurs 7 8			6	3	5	8	9	0.568055	60/60	

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5 3 10 3 8 5	7	8	5	6	0.568055	59/60	
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4 6 7 4 8 8	6	6	5	6	0.964295	59/60	
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6 4 7 3 7 7	5	8	6	7	0.931952	58/60	
RandomExcursionsVariant 8 1 5 7 3 6	6	8	8	8	0.468595	E0/60	
RandomExcursionsVariant	0	0	0	0	0.400393	58/60	
7 2 4 3 13 6	4	4	10	7	0.043745	58/60	
RandomExcursionsVariant	4	4	10	,	0.043743	30/00	
6 3 5 8 7 5	6	4	8	8	0.862344	58/60	
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6 5 6 7 4 6	4	9	8	5	0.911413	60/60	
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11 4 7 7 6 6	5	7	4	3	0.568055	60/60	
RandomExcursionsVariant							
9 10 2 7 7 8	4	7	4	2	0.213309	60/60	
RandomExcursionsVariant							
0 8 6 6 5 2	9	5	9	10	0.082177	60/60	
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2 7 6 6 3 9	9	5	8	5	0.500934	60/60	
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4 4 6 4 12 9	8	3	7	3	0.148094	60/60	
RandomExcursionsVariant							
2 9 2 7 8 6	6	6	7	7	0.534146	60/60	
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3 5 3 6 12 8	3	4	8	8	0.148094	59/60	
RandomExcursionsVariant	6	2	_	4.0	0 005474	F0.460	
3 2 6 4 8 10	6	3	5	13	0.035174	58/60	
RandomExcursionsVariant	0	_	0	_	0 (02450	F0 /60	
4 4 4 4 9 5 RandomExcursionsVariant	9	6	9	6	0.602458	59/60	
5 5 3 7 6 5	8	7	4	10	0.706149	59/60	
RandomExcursionsVariant	0	/	4	10	0.700149	39/00	
5 3 7 7 6 7	5	6	5	9	0.911413	60/60	
RandomExcursionsVariant	J	U	J	9	0.911413	00/00	
10 16 11 17 3 6	5	10	11	11	0.037566	99/100	Serial
11 11 10 7 13 12		7	11	7	0.883171	99/100	Serial
9 12 10 6 6 12		6	17	7	0.122325	100/100	55. 13.
LinearComplexity		Ü	_,	,	3.2220	_00, _00	
,							

The minimum pass rate for each statistical test with the exception of the random excursion (variant) test is approximately = 96 for a sample size = 100 binary sequences.

The minimum pass rate for the random excursion (variant) test is approximately = 57 for a sample size = 60 binary sequences.

For further guidelines construct a probability table using the MAPLE program

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provided in the addendum section of the documentation.

Wyniki dla pliku zeros_sha3.bit

- plik 143 MB (tak samo jak plik zeros.bit)
- hash utworzony w skali 1:1
- ustawienia testu:
 - o 100 bitstreams
 - o length: 1000_000

ACES Derator C2 C3 O 0 Frequen O 0 AtiveSu O tiveSu O tiveSu	C4 0 0 cy 0 ms 0				C8	C9 0 0	C10 0 75	0.000000	* *	0/100	*	ATISTICAL Frequency
0 0 25 0 Frequen 0 0 ativeSu	C4 0 0 cy 0 ms 0	C5 0 0 0	C6	C7	C8	C9 0 0	C10 0 75	0.000000	* *	0/100	*	
0 0 25 0 Frequen 0 0 ativeSu	C4 0 0 cy 0 ms 0	C5 0 0 0	C6	C7	C8	C9 0 0	C10 0 75	0.000000	* *	0/100	*	
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25 0 Frequen 0 0 ativeSu 0 0	O Cy O ms	0	0	0	0	0	75	0.000000	*			Frequency
requen 0 0 ativeSu 0 0	cy 0 ms	0								100/100		
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ativeSu 0 0	ms 0		0	0	0	Ω	0					
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ativeSu		U	0	0	0	0	0	0.000000	*	0/100	*	
	ms											
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tRun												
0 0	0	0	0	0	0	0	0	0.000000	*	0/100	*	Rank
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	O	O	O	U	0.000000	7	0/100	Τ
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	Ü		Ü	Ü		•	0, 100	·
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate							,	
100 0 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	O	O	0	01000000	-1-	0/100	
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	O	O	0	01000000	71.	0/100	
100 0 0 0 0 0 0 NanOverlanningTemplate	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate								
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	O	Ü	0	01000000	-1-	0, 100	
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate	V	V	V	U	0.000000	~	0/100	^
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	V	V	V	U	0.000000		0/100	^
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	0	0	0	0.00000		0 (100	
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate							·	
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100 0 0 0 0 0 NonOverlappingTemplate	V	V	U	V	0.000000	本	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTempla		0	0	0	0	0 000000	.1.	0 /100	
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NonOverlappingTempla	ate								
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTempla		0	0	0	0	0 000000	.1.	0/100	als.
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NonOverlappingTempla		U	U	V	U	0.000000	Α.	0/100	^
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla								,	
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
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	0	0	0	0	0	0.000000	*	0/100	*
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	0	0	0	0	0	0.000000	*	0/100	*
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100 0 0 0 0		0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla 100 0 0 0 0		0	0	0	0	0.000000	4	0/100	*
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NonOverlappingTempla								0, 200	
100 0 0 0 0		0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTempla									
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NonOverlappingTempla		U	U	V	U	0.000000	^	0/ 100	Τ
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NonOverlappingTemplate						0, 200	
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NonOverlappingTemplate	O	O	O	U	0.000000	0/100	T
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100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	Ü		Ü	Ü		·	0, 100	·
100 0 0 0 0 0 NonOverlappingTemplate	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	O	O	0	01000000	71*	0/100	
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	U	U	O	U	01000000	7	0/100	Τ
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate							·	
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	O	O	0	01000000	71*	0/100	
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	O	U	O	U	01000000	7	0/100	Τ
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate	0	O	O	0	01000000	71*	0/100	
100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	sle.	0/100	ste.
NonOverlappingTemplate	V	V	V	U	0.000000	*	0/100	*
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NonOverlappingTemplate 100 0 0 0 0 0	0	0	0	0	0.000000	*	0/100	*
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NonOverlappingTempla		0	0	0	0	0 000000	.1.	0 /100	
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100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla		Ū	Ü	Ü		0.00000		0, 200	•
100 0 0 0 0		0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla	ate								
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NonOverlappingTempla	ate								
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla									
100 0 0 0 0	. 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla		0	0	0	0	0 000000	.1.	0/100	als.
100 0 0 0 0 NonOverlappingTempla	0	0	0	0	0	0.000000	*	0/100	*
100 0 0 0 0 0	a L E	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla		U	U	V	U	0.000000	Α.	0/100	^
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla								,	
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla	ate								
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla									
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NonOverlappingTempla 100 0 0 0 0		0	0	0	0	0 000000	.1.	0/100	als.
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100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla		0	0	0	U	01000000	*1*	0/100	
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla	ate								
	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla	ate								
	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla									
100 0 0 0 0		0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla 100 0 0 0 0		0	0	0	0	0.000000	4	0/100	*
NonOverlappingTempla		U	U	V	U	0.000000	*	0/100	*
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NonOverlappingTempla								0, 200	
100 0 0 0 0		0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla	ate								
100 0 0 0 0	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla									
100 0 0 0 0		0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla		0	0	0	0	0.00000		0/100	
	0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla 100 0 0 0 0	ate 0	0	0	0	0	0.000000	*	0/100	*
NonOverlappingTempla		U	U	V	U	0.000000	^	0/ 100	Τ
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NonOverlappingTempla		ū						, _0	
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NonOverlappingTemplate		0	0	0	0 000000	0 /100	.1.	
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NonOverlappingTemplate		0	0	0	0 000000	0 (100		
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NonOverlappingTemplate		0	0	0	0 000000	0 (100		
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NonOverlappingTemplate		0	0	0	0 000000	0 (100		
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Skrypt hashujący

1. Podział pliku na fragmenty:

- o Plik wejściowy jest odczytywany w całości do bufora.
- o Bufor jest dzielony na fragmenty o stałym rozmiarze (np. 256 bajtów).

2. Hashowanie fragmentów:

- o Każdy fragment jest przetwarzany za pomocą algorytmu SHA3-256.
- Wynik hashowania każdego fragmentu to 32-bajtowy skrót (hash).

3. Kopiowanie wyników:

• Wyniki hashowania (32-bajtowe skróty) są kopiowane do odpowiednich pozycji w buforze wyjściowym, aby zachować strukturę odpowiadającą długości pliku wejściowego.

W efekcie algorytm generuje hash o tej samej długości co plik wejściowy, gdzie każdy fragment pliku jest reprezentowany przez swój skrót SHA3-256.

Skrypt znajduje się: skrypt

Wnioski:

Plik TRNG_P zawiera ciąg binarny o bardzo dobrych właściwościach losowości. Wszystkie testy zostały zaliczone

Plik z samych zer (ciąg deterministyczny) nie przeszedł żadnego testu. Wszystkie P-wartości wynosiły 0, a proporcja przejść (R) to 0/100, co potwierdza całkowity brak losowości i zgodność z oczekiwaniami.

Funkcja skrótu SHA-3 zastosowana do danych z losowego generatora (TRNG_P) nie osłabiła ich losowości – dane pozostały statystycznie losowe po przetworzeniu.

Wygenerowany plik zeros_sha3.bit, mimo że formalnie zawiera dane pochodzące z funkcji skrótu SHA-3, nie zachowuje losowości. Dzieje się tak, poniewaz plik zerosk_sha3.bit to nic innego jak wiele połączonych tych samych wyników funkcji hashującej.

Funkcja SHA-3, choć kryptograficznie bezpieczna, nie może być traktowana jako generator liczb losowych przy bezpośrednim zastosowaniu w trybie hashowania bloków danych 1:1.