NIST TEST SUITE FOR TRUE RANDOMNESS

A Statistical Test Suite for Random and Pseudorandom Number Generators for Cryptographic Applications

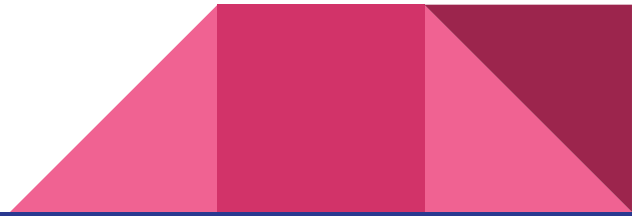
NIST TEST SUITE FOR TRUE RANDOMNESS

The NIST Test Suite is a statistical package consisting of 15 tests that were developed to test the randomness of (arbitrarily long) binary sequences produced by either hardware or software based cryptographic random or pseudorandom number generators.

1. The Frequency (Monobit) Test,
2. Frequency Test within a Block,
3. The Runs Test
4. Tests for the Longest-Run-of-Ones in a Block,
5. The Binary Matrix Rank Test,
6. The Discrete Fourier Transform (Spectral) Test,
7. The Non-overlapping Template Matching Test,
8. The Overlapping Template Matching Test,
9. Maurer's "Universal Statistical" Test,
10. The Linear Complexity Test,
11. The Serial Test,
12. The Approximate Entropy Test,
13. The Cumulative Sums (Cusums) Test,
14. The Random Excursions Test
15. The Random Excursions Variant Test.

Frequency (Monobit) Test

- The focus of the test is the proportion of zeros and ones for the entire sequence.
- The purpose of this test is to determine whether the number of ones and zeros in a sequence are approximately the same as would be expected for a truly random sequence.
- The test assesses the closeness of the fraction of ones to ½, that is, the number of ones and zeros in a sequence should be about the same

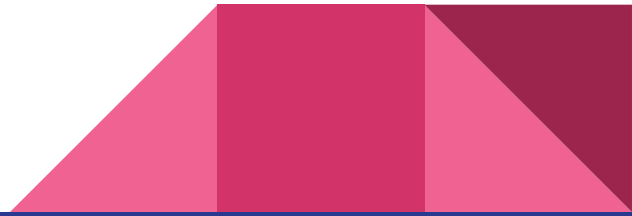


Frequency Test within a Block

- The focus of the test is the proportion of ones within M-bit blocks.
- The purpose of this test is to determine whether the frequency of ones in an M-bit block is approximately M/2, as would be expected under an assumption of randomness
- For block size M=1, this test degenerates to test 1, the Frequency (Monobit) test.

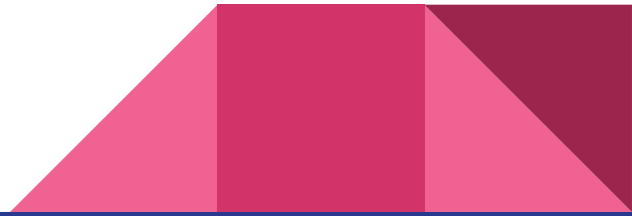
Runs Test

- The focus of this test is the total number of runs in the sequence, where a run is an uninterrupted sequence of identical bits.
- A run of length k consists of exactly k identical bits and is bounded before and after with a bit of the opposite value.
- The purpose of the runs test is to determine whether the number of runs of ones and zeros of various lengths is as expected for a random sequence



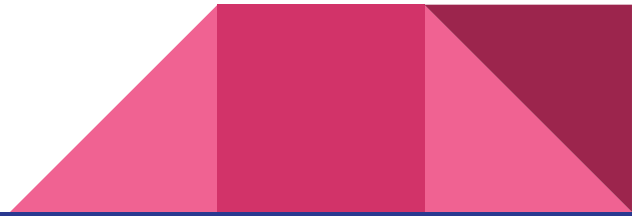
Test for the Longest Run of Ones in a Block

- The focus of the test is the longest run of ones within M-bit blocks.
- The purpose of this test is to determine whether the length of the longest run of ones within the tested sequence is consistent with the length of the longest run of ones that would be expected in a random sequence.
- Note that an irregularity in the expected length of the longest run of ones implies that there is also an irregularity in the expected length of the longest run of zeroes.
- Therefore, only a test for ones is necessary



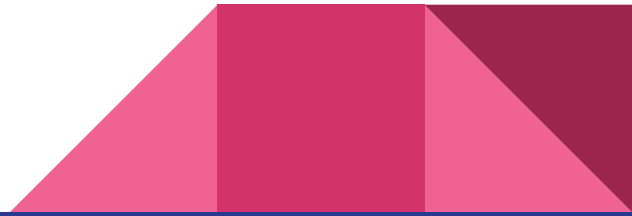
Binary Matrix Rank Test

- The focus of the test is the rank of disjoint sub-matrices of the entire sequence.
- The purpose of this test is to check for linear dependence among fixed length substrings of the original sequence.



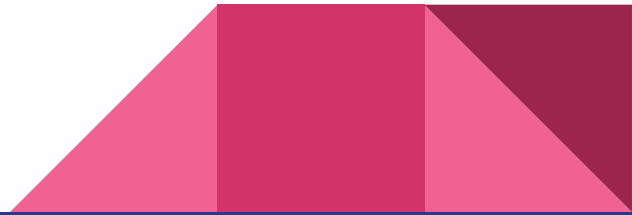
Discrete Fourier Transform (Spectral) Test

- The focus of this test is the peak heights in the Discrete Fourier Transform of the sequence.
- The purpose of this test is to detect periodic features (i.e., repetitive patterns that are near each other) in the tested sequence that would indicate a deviation from the assumption of randomness.
- The intention is to detect whether the number of peaks exceeding the 95 % threshold is significantly different than 5 %.



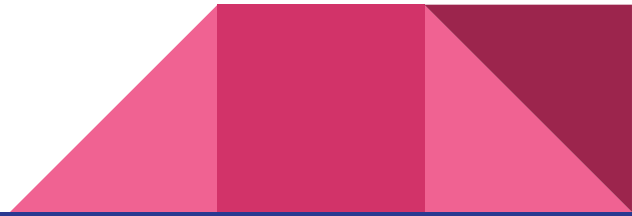
Non-overlapping Template Matching Test

- The focus of this test is the number of occurrences of pre-specified target strings.
- The purpose of this test is to detect generators that produce too many occurrences of a given non-periodic (aperiodic) pattern.
- For this test an m-bit window is used to search for a specific m-bit pattern.
- If the pattern is not found, the window slides one bit position. If the pattern is found, the window is reset to the bit after the found pattern, and the search resumes.



Overlapping Template Matching Test

- The focus of the Overlapping Template Matching test is the number of occurrences of pre-specified target strings.
- Both this test and the Non-overlapping Template Matching test use an m-bit window to search for a specific m-bit pattern.
- If the pattern is not found, the window slides one bit position.



Maurer’s “Universal Statistical” Test

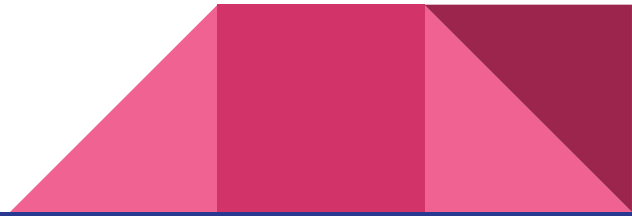
- The focus of this test is the number of bits between matching patterns (a measure that is related to the length of a compressed sequence).
- The purpose of the test is to detect whether or not the sequence can be significantly compressed without loss of information.
- A significantly compressible sequence is considered to be non-random.

Linear Complexity Test

- The focus of this test is the length of a linear feedback shift register (LFSR).
- The purpose of this test is to determine whether or not the sequence is complex enough to be considered random.
- Random sequences are characterized by longer LFSRs.
- An LFSR that is too short implies non-randomness

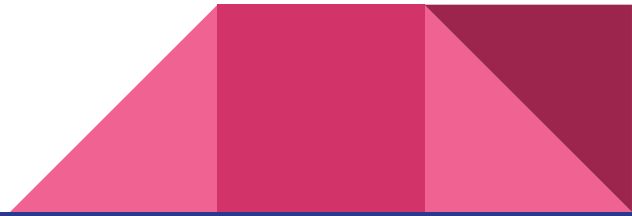
Serial Test

- The focus of this test is the frequency of all possible overlapping m-bit patterns across the entire sequence.
- The purpose of this test is to determine whether the number of occurrences of the 2^m m-bit overlapping patterns is approximately the same as would be expected for a random sequence.
- Random sequences have uniformity; that is, every m-bit pattern has the same chance of appearing as every other m-bit pattern.



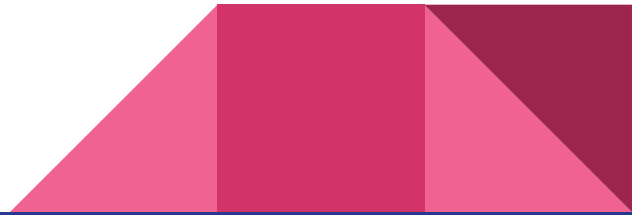
Approximate Entropy Test

- As with the Serial test the focus of this test is the frequency of all possible overlapping m-bit patterns across the entire sequence.
- The purpose of the test is to compare the frequency of overlapping blocks of two consecutive/adjacent lengths (m and m+1) against the expected result for a random sequence.



Cumulative Sums (Cusum) Test

- The focus of this test is the maximal excursion (from zero) of the random walk defined by the cumulative sum of adjusted (-1, +1) digits in the sequence.
- The purpose of the test is to determine whether the cumulative sum of the partial sequences occurring in the tested sequence is too large or too small relative to the expected behavior of that cumulative sum for random sequences.
- This cumulative sum may be considered as a random walk

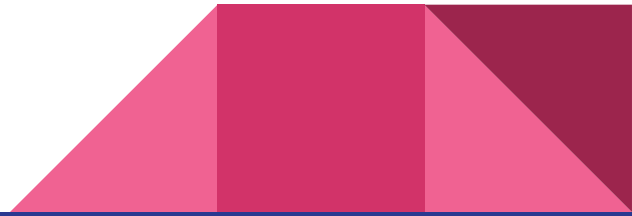


Random Excursions Test

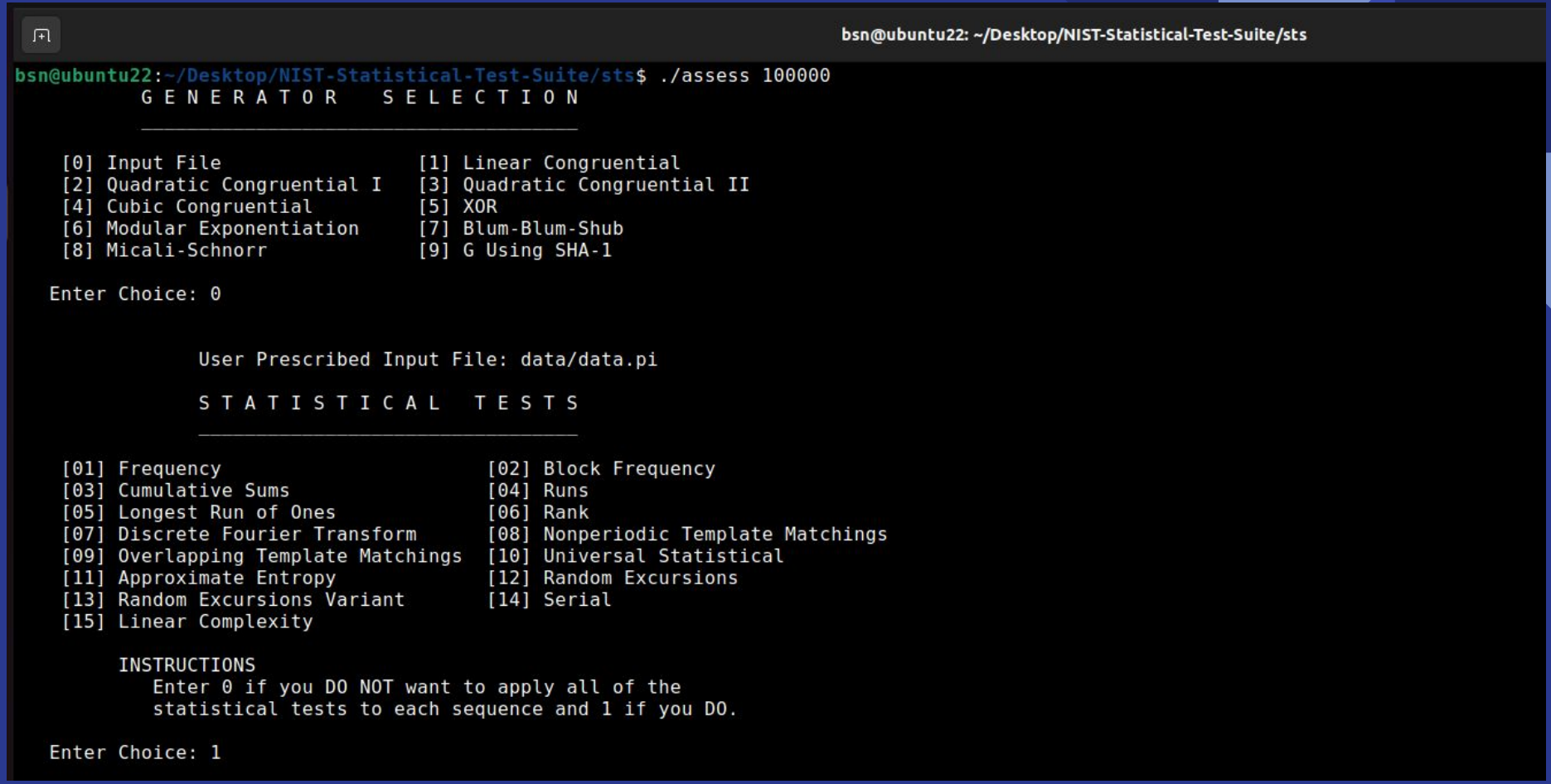
- The focus of this test is the number of cycles having exactly K visits in a cumulative sum random walk.
- The cumulative sum random walk is derived from partial sums after the (0,1) sequence is transferred to the appropriate (-1, +1) sequence.A cycle of a random walk consists of a sequence of steps of unit length taken at random that begin at and return to the origin.
- The purpose of this test is to determine if the number of visits to a particular state within a cycle deviates from what one would expect for a random sequence.
- This test is actually a series of eight tests , one test and conclusion for each of the states: -4, -3, -2, -1 and +1, +2, +3, +4.

Random Excursions Variant Test

- The focus of this test is the total number of times that a particular state is visited in a cumulative sum random walk.
- The purpose of this test is to detect deviations from the expected number of visits to various states in the random walk.
- This test is actually a series of eighteen tests (and conclusions), one test and conclusion for each of the states: -9, -8, …, -1 and +1, +2, …, +9.



EXAMPLE


bsn@ubuntu22: ~/Desktop/NIST-Statistical-Test-Suite/sts
bsn@ubuntu22:~/Desktop/NIST-Statistical-Test-Suite/sts$ ./assess 100000
G E N E R A T O R S E L E C T I O N
[0] Input File
[1] Linear Congruential
[2] Quadratic Congruential I
[3] Quadratic Congruential II
[4] Cubic Congruential
[5] XOR
[6] Modular Exponentiation
[7] Blum-Blum-Shub
[8] Micali-Schnorr
[9] G Using SHA-1
Enter Choice: 0
User Prescribed Input File: data/data.pi
S T A T I S T I C A L T E S T S
[01] Frequency
[02] Block Frequency
[03] Cumulative Sums
[04] Runs
[05] Longest Run of Ones
[06] Rank
[07] Discrete Fourier Transform
[08] Nonperiodic Template Matchings
[09] Overlapping Template Matchings
[10] Universal Statistical
[11] Approximate Entropy
[12] Random Excursions
[13] Random Excursions Variant
[14] Serial
[15] Linear Complexity
INSTRUCTIONS
Enter 0 if you DO NOT want to apply all of the
statistical tests to each sequence and 1 if you DO.
Enter Choice: 1

```
            S T A T I S T I C A L   T E S T S
            _________________________________

 [01] Frequency                       [02] Block Frequency
 [03] Cumulative Sums                 [04] Runs
 [05] Longest Run of Ones             [06] Rank
 [07] Discrete Fourier Transform      [08] Nonperiodic Template Matchings
 [09] Overlapping Template Matchings  [10] Universal Statistical
 [11] Approximate Entropy             [12] Random Excursions
 [13] Random Excursions Variant       [14] Serial
 [15] Linear Complexity

      INSTRUCTIONS
         Enter 0 if you DO NOT want to apply all of the
         statistical tests to each sequence and 1 if you DO.

Enter Choice: 1

     P a r a m e t e r   A d j u s t m e n t s
     ----------------------------------------
 [1] Block Frequency Test - block length(M):         128
 [2] NonOverlapping Template Test - block length(m): 9
 [3] Overlapping Template Test - block length(m):    9
 [4] Approximate Entropy Test - block length(m):     10
 [5] Serial Test - block length(m):                  16
 [6] Linear Complexity Test - block length(M):       500

Select Test (0 to continue): 0

How many bitstreams? 10

Input File Format:
 [0] ASCII - A sequence of ASCII 0's and 1's
 [1] Binary - Each byte in data file contains 8 bits of data

Select input mode:  0

  Statistical Testing In Progress.........



  Statistical Testing Complete!!!!!!!!!!!!
```

Open

finalAnalysisReport.txt
~/Desktop/NIST-Statistical-Test-Suite/sts/experiments/AlgorithmTesting

```
------------------------------------------------------------------------------
RESULTS FOR THE UNIFORMITY OF P-VALUES AND THE PROPORTION OF PASSING SEQUENCES
------------------------------------------------------------------------------
   generator is <data/data.pi>
------------------------------------------------------------------------------
 C1  C2  C3  C4  C5  C6  C7  C8  C9 C10  P-VALUE  PROPORTION  STATISTICAL TEST
------------------------------------------------------------------------------
  1   1   3   0   0   2   1   0   1   1 0.534146     10/10      Frequency
  1   2   1   0   2   2   1   0   1   0 0.739918     10/10      BlockFrequency
  1   1   1   2   1   0   0   2   1   1 0.911413     10/10      CumulativeSums
  1   2   0   1   1   1   1   2   1   0 0.911413     10/10      CumulativeSums
  0   4   1   1   0   2   0   1   0   1 0.122325     10/10      Runs
  0   1   0   4   1   0   1   1   1   1 0.213309     10/10      LongestRun
  1   1   0   1   1   1   2   1   0   2 0.911413     10/10      Rank
  2   1   0   0   2   1   1   1   2   0 0.739918     10/10      FFT
  1   2   1   0   2   2   1   1   0   0 0.739918     10/10      NonOverlappingTemplate
  1   3   0   0   3   3   0   0   0   0 0.035174     10/10      NonOverlappingTemplate
  3   1   1   0   0   1   0   3   0   1 0.213309     10/10      NonOverlappingTemplate
  2   0   1   2   1   0   1   2   1   0 0.739918     10/10      NonOverlappingTemplate
  0   2   1   1   0   2   1   1   2   0 0.739918     10/10      NonOverlappingTemplate
  1   1   1   1   0   1   0   2   2   1 0.911413     10/10      NonOverlappingTemplate
  0   2   1   1   1   2   1   0   1   1 0.911413     10/10      NonOverlappingTemplate
  2   1   1   1   1   0   1   3   0   0 0.534146     10/10      NonOverlappingTemplate
  1   0   1   1   1   2   1   0   2   1 0.911413      9/10      NonOverlappingTemplate
  0   0   2   1   0   1   1   4   1   0 0.122325     10/10      NonOverlappingTemplate
  0   2   0   2   0   1   2   1   1   1 0.739918     10/10      NonOverlappingTemplate
  2   1   1   1   1   1   0   0   2   1 0.911413     10/10      NonOverlappingTemplate
  1   1   3   1   0   1   1   1   1   0 0.739918     10/10      NonOverlappingTemplate
  4   0   1   0   0   1   1   1   0   2 0.122325      9/10      NonOverlappingTemplate
  1   2   1   0   1   2   1   0   0   2 0.739918     10/10      NonOverlappingTemplate
  3   0   1   1   1   1   0   2   1   0 0.534146     10/10      NonOverlappingTemplate
  2   1   0   0   2   1   1   2   0   1 0.739918      9/10      NonOverlappingTemplate
  0   0   1   3   1   2   0   1   1   1 0.534146     10/10      NonOverlappingTemplate
  0   1   1   1   1   0   0   2   3   1 0.534146     10/10      NonOverlappingTemplate
  1   1   0   2   1   1   1   0   2   1 0.911413      9/10      NonOverlappingTemplate
  0   1   2   0   1   1   1   2   2   0 0.739918     10/10      NonOverlappingTemplate
  0   0   0   2   3   1   2   2   0   0 0.213309     10/10      NonOverlappingTemplate
  2   0   1   5   0   1   0   0   1   0 0.008879      9/10      NonOverlappingTemplate
  1   1   3   1   0   1   1   0   2   0 0.534146     10/10      NonOverlappingTemplate
  4   2   1   0   2   0   0   0   1   0 0.066882     10/10      NonOverlappingTemplate
  5   1   1   1   0   0   1   0   0   1 0.017912     10/10      NonOverlappingTemplate
  2   1   2   1   1   1   0   1   1   0 0.911413     10/10      NonOverlappingTemplate
  3   2   0   1   1   1   1   1   0   0 0.534146      9/10      NonOverlappingTemplate
  1   1   1   0   1   0   4   1   1   0 0.213309     10/10      NonOverlappingTemplate
  0   1   2   1   1   1   1   1   1   1 0.991468     10/10      NonOverlappingTemplate
  0   1   1   1   2   0   1   0   2   2 0.739918     10/10      NonOverlappingTemplate
  2   1   1   1   1   2   2   0   0   0 0.739918     10/10      NonOverlappingTemplate
  0   0   1   0   2   3   0   0   2   2 0.213309     10/10      NonOverlappingTemplate
  0   1   1   1   1   1   2   2   0   1 0.911413     10/10      NonOverlappingTemplate
  1   1   0   0   0   2   4   2   0   0 0.066882     10/10      NonOverlappingTemplate
```

51	0	2	1	1	2	0	2	0	2	0	0.534146	10/10	NonOverlappingTemplate
52	0	1	0	1	2	2	1	2	0	1	0.739918	10/10	NonOverlappingTemplate
53	1	0	1	1	0	0	1	2	0	4	0.122325	10/10	NonOverlappingTemplate
54	2	2	0	0	2	1	2	0	1	0	0.534146	9/10	NonOverlappingTemplate
55	2	0	1	1	2	1	1	0	1	1	0.911413	10/10	NonOverlappingTemplate
56	2	0	5	0	0	2	1	0	0	0	0.004301	9/10	NonOverlappingTemplate
57	0	0	1	1	1	0	2	3	1	1	0.534146	10/10	NonOverlappingTemplate
58	2	1	2	1	1	0	0	0	1	2	0.739918	9/10	NonOverlappingTemplate
59	1	0	2	1	0	0	5	1	0	0	0.008879	10/10	NonOverlappingTemplate
60	0	2	1	1	2	2	0	1	0	1	0.739918	10/10	NonOverlappingTemplate
61	1	0	1	3	0	2	0	1	0	2	0.350485	10/10	NonOverlappingTemplate
62	1	2	1	1	1	0	0	1	1	2	0.911413	10/10	NonOverlappingTemplate
63	2	0	1	0	1	0	0	4	0	2	0.066882	10/10	NonOverlappingTemplate
64	0	0	0	2	1	1	3	2	1	0	0.350485	10/10	NonOverlappingTemplate
65	2	1	2	1	0	2	1	0	1	0	0.739918	10/10	NonOverlappingTemplate
66	3	1	0	2	0	0	1	1	0	2	0.350485	10/10	NonOverlappingTemplate
67	0	1	2	1	1	0	1	2	0	2	0.739918	10/10	NonOverlappingTemplate
68	0	1	1	1	3	1	0	2	1	0	0.534146	10/10	NonOverlappingTemplate
69	1	0	1	0	1	1	1	1	3	1	0.739918	10/10	NonOverlappingTemplate
70	1	1	3	2	0	0	1	0	2	0	0.350485	10/10	NonOverlappingTemplate
71	1	0	1	1	0	1	1	1	2	2	0.911413	10/10	NonOverlappingTemplate
72	2	0	2	0	0	1	2	2	0	1	0.534146	10/10	NonOverlappingTemplate
73	1	1	1	0	1	1	0	1	3	1	0.739918	10/10	NonOverlappingTemplate
74	1	1	1	1	1	0	2	0	1	2	0.911413	10/10	NonOverlappingTemplate
75	1	1	3	1	0	1	1	2	0	0	0.534146	10/10	NonOverlappingTemplate
76	0	2	1	0	0	0	2	2	1	2	0.534146	10/10	NonOverlappingTemplate
77	1	1	0	2	2	0	1	0	1	2	0.739918	10/10	NonOverlappingTemplate
78	0	0	0	0	4	1	3	0	1	1	0.035174	10/10	NonOverlappingTemplate
79	2	1	3	0	0	1	1	0	0	2	0.350485	10/10	NonOverlappingTemplate
80	0	1	1	2	0	1	0	0	3	2	0.350485	10/10	NonOverlappingTemplate
81	0	1	0	1	1	2	0	1	2	2	0.739918	10/10	NonOverlappingTemplate
82	1	3	0	3	0	2	0	1	0	0	0.122325	10/10	NonOverlappingTemplate
83	1	2	0	0	2	1	2	1	1	0	0.739918	10/10	NonOverlappingTemplate
84	0	1	0	2	1	2	1	2	0	1	0.739918	10/10	NonOverlappingTemplate
85	0	2	0	1	1	1	3	1	1	0	0.534146	10/10	NonOverlappingTemplate
86	1	2	2	1	1	1	0	0	1	1	0.911413	10/10	NonOverlappingTemplate
87	1	1	1	4	1	1	0	1	0	0	0.213309	10/10	NonOverlappingTemplate
88	0	0	0	1	3	1	0	3	2	0	0.122325	10/10	NonOverlappingTemplate
89	0	1	1	2	1	1	1	2	0	1	0.911413	10/10	NonOverlappingTemplate
90	1	2	1	0	2	2	1	1	0	0	0.739918	10/10	NonOverlappingTemplate
91	3	1	2	1	0	0	0	1	0	2	0.350485	10/10	NonOverlappingTemplate
92	1	0	1	2	2	1	0	1	1	1	0.911413	10/10	NonOverlappingTemplate
93	0	1	1	1	2	1	3	1	0	0	0.534146	10/10	NonOverlappingTemplate
94	0	3	1	0	2	2	1	0	1	0	0.350485	10/10	NonOverlappingTemplate
95	1	0	0	0	3	3	1	1	0	1	0.213309	10/10	NonOverlappingTemplate
96	2	0	1	1	1	1	1	1	1	1	0.991468	10/10	NonOverlappingTemplate
97	1	1	1	1	0	1	0	2	1	2	0.911413	10/10	NonOverlappingTemplate
98	1	2	0	0	0	3	2	1	0	1	0.350485	10/10	NonOverlappingTemplate
99	0	1	0	1	0	0	1	2	3	2	0.350485	10/10	NonOverlappingTemplate
100	1	0	2	1	3	0	1	2	0	0	0.350485	10/10	NonOverlappingTemplate

101	0	2	2	1	1	1	1	0	1	1	0.911413	10/10	NonOverlappingTemplate
102	0	1	0	3	0	0	1	3	1	1	0.213309	10/10	NonOverlappingTemplate
103	2	2	3	1	0	0	1	1	0	0	0.350485	10/10	NonOverlappingTemplate
104	2	1	0	0	0	0	0	1	2	4	0.066882	10/10	NonOverlappingTemplate
105	1	1	0	0	1	3	1	1	0	2	0.534146	10/10	NonOverlappingTemplate
106	0	1	0	2	1	0	4	1	0	1	0.122325	10/10	NonOverlappingTemplate
107	0	4	0	0	1	1	1	0	2	1	0.122325	10/10	NonOverlappingTemplate
108	1	1	0	1	1	1	1	2	0	2	0.911413	10/10	NonOverlappingTemplate
109	2	2	2	0	2	0	1	0	1	0	0.534146	10/10	NonOverlappingTemplate
110	0	1	3	1	0	1	2	0	0	2	0.350485	10/10	NonOverlappingTemplate
111	1	2	0	0	1	1	1	0	1	3	0.534146	10/10	NonOverlappingTemplate
112	2	0	1	1	1	1	2	0	0	2	0.739918	10/10	NonOverlappingTemplate
113	0	2	1	1	0	1	2	2	0	1	0.739918	10/10	NonOverlappingTemplate
114	0	0	4	1	1	0	1	1	0	2	0.122325	10/10	NonOverlappingTemplate
115	1	1	1	0	2	2	0	1	2	0	0.739918	10/10	NonOverlappingTemplate
116	2	1	1	1	0	1	1	0	0	3	0.534146	9/10	NonOverlappingTemplate
117	0	1	0	1	0	1	1	0	3	3	0.213309	10/10	NonOverlappingTemplate
118	1	1	2	1	1	1	0	2	0	1	0.911413	10/10	NonOverlappingTemplate
119	0	2	0	0	1	0	3	1	2	1	0.350485	10/10	NonOverlappingTemplate
120	3	0	1	1	1	0	1	1	1	1	0.739918	10/10	NonOverlappingTemplate
121	1	1	1	1	1	0	0	2	1	2	0.911413	10/10	NonOverlappingTemplate
122	2	2	0	0	0	1	2	1	1	1	0.739918	10/10	NonOverlappingTemplate
123	0	0	1	2	2	0	2	1	2	0	0.534146	10/10	NonOverlappingTemplate
124	1	1	0	2	1	1	0	2	1	1	0.911413	10/10	NonOverlappingTemplate
125	0	2	0	1	3	1	1	2	0	0	0.350485	10/10	NonOverlappingTemplate
126	2	1	1	1	2	0	0	2	1	0	0.739918	9/10	NonOverlappingTemplate
127	0	1	2	0	1	3	1	0	2	0	0.350485	10/10	NonOverlappingTemplate
128	1	1	0	1	2	0	3	1	1	0	0.534146	10/10	NonOverlappingTemplate
129	2	0	1	1	0	0	1	0	2	3	0.350485	10/10	NonOverlappingTemplate
130	1	0	0	1	0	0	1	4	2	1	0.122325	10/10	NonOverlappingTemplate
131	0	2	0	3	1	3	0	0	0	1	0.122325	10/10	NonOverlappingTemplate
132	0	0	2	1	2	2	1	1	0	1	0.739918	10/10	NonOverlappingTemplate
133	1	1	1	3	0	0	2	1	0	1	0.534146	10/10	NonOverlappingTemplate
134	1	1	1	0	1	1	2	0	3	0	0.534146	10/10	NonOverlappingTemplate
135	3	0	1	3	1	1	0	0	0	1	0.213309	10/10	NonOverlappingTemplate
136	1	1	3	1	0	2	0	1	0	1	0.534146	10/10	NonOverlappingTemplate
137	1	0	0	2	3	1	1	1	0	1	0.534146	10/10	NonOverlappingTemplate
138	0	0	2	0	2	1	1	1	2	1	0.739918	10/10	NonOverlappingTemplate
139	1	3	1	0	1	1	0	0	3	0	0.213309	10/10	NonOverlappingTemplate
140	1	0	2	2	1	1	1	1	0	1	0.911413	10/10	NonOverlappingTemplate
141	2	2	1	1	0	2	1	0	1	0	0.739918	10/10	NonOverlappingTemplate
142	1	1	4	1	1	0	0	1	0	1	0.213309	10/10	NonOverlappingTemplate
143	0	3	0	0	0	0	1	1	2	3	0.122325	10/10	NonOverlappingTemplate
144	0	0	0	1	4	1	1	2	0	1	0.122325	10/10	NonOverlappingTemplate
145	4	2	1	1	0	1	0	0	1	0	0.122325	10/10	NonOverlappingTemplate
146	0	1	2	2	0	1	0	1	1	2	0.739918	10/10	NonOverlappingTemplate
147	0	1	2	1	2	1	1	1	1	0	0.911413	10/10	NonOverlappingTemplate
148	1	0	1	0	0	0	2	0	1	5	0.008879	10/10	NonOverlappingTemplate
149	2	0	3	2	0	0	1	0	2	0	0.213309	9/10	NonOverlappingTemplate
150	4	1	2	1	1	0	0	0	0	1	0.122325	9/10	NonOverlappingTemplate

151	2	2	1	1	0	2	0	1	0	1	0.739918	10/10		NonOverlappingTemplate
152	0	1	0	1	5	1	0	1	0	1	0.017912	10/10		NonOverlappingTemplate
153	0	0	0	2	0	1	3	1	2	1	0.350485	10/10		NonOverlappingTemplate
154	0	1	1	1	0	1	3	1	1	1	0.739918	10/10		NonOverlappingTemplate
155	1	0	1	1	1	2	2	0	2	0	0.739918	10/10		NonOverlappingTemplate
156	2	0	0	0	0	1	2	2	1	2	0.534146	10/10		NonOverlappingTemplate
157	1	0	2	1	0	1	2	0	1	2	0.739918	10/10		NonOverlappingTemplate
158	1	0	1	0	1	3	2	0	1	1	0.534146	10/10		NonOverlappingTemplate
159	1	0	0	0	2	2	1	3	1	0	0.350485	10/10		NonOverlappingTemplate
160	2	2	1	0	0	2	1	0	1	1	0.739918	10/10		NonOverlappingTemplate
161	3	2	0	3	0	1	0	0	1	0	0.122325	10/10		NonOverlappingTemplate
162	2	2	0	2	0	2	2	0	0	0	0.350485	10/10		NonOverlappingTemplate
163	0	1	1	2	1	1	1	2	0	1	0.911413	10/10		NonOverlappingTemplate
164	4	0	1	2	0	1	0	0	0	2	0.066882	9/10		OverlappingTemplate
165	10	0	0	0	0	0	0	0	0	0	0.000000 *	0/10	*	Universal
166	0	1	1	2	0	1	3	1	1	0	0.534146	10/10		ApproximateEntropy
167	0	2	0	0	0	0	0	0	0	0	----	2/2		RandomExcursions
168	0	0	0	0	1	0	1	0	0	0	----	2/2		RandomExcursions
169	0	0	0	0	1	0	0	1	0	0	----	2/2		RandomExcursions
170	0	0	0	0	0	0	1	1	0	0	----	2/2		RandomExcursions
171	0	0	1	0	0	0	0	1	0	0	----	2/2		RandomExcursions
172	0	0	1	0	0	0	0	0	0	1	----	2/2		RandomExcursions
173	0	0	0	1	0	0	1	0	0	0	----	2/2		RandomExcursions
174	0	1	0	0	1	0	0	0	0	0	----	2/2		RandomExcursions
175	0	0	0	1	0	0	0	1	0	0	----	2/2		RandomExcursionsVariant
176	0	0	0	1	0	0	0	1	0	0	----	2/2		RandomExcursionsVariant
177	0	0	0	1	0	0	0	0	0	1	----	2/2		RandomExcursionsVariant
178	0	0	0	1	0	1	0	0	0	0	----	2/2		RandomExcursionsVariant
179	0	0	0	0	1	1	0	0	0	0	----	2/2		RandomExcursionsVariant
180	0	0	0	0	2	0	0	0	0	0	----	2/2		RandomExcursionsVariant
181	0	0	0	1	1	0	0	0	0	0	----	2/2		RandomExcursionsVariant
182	0	0	0	0	0	1	1	0	0	0	----	2/2		RandomExcursionsVariant
183	0	0	0	0	0	2	0	0	0	0	----	2/2		RandomExcursionsVariant
184	0	1	0	0	0	0	0	0	0	1	----	2/2		RandomExcursionsVariant
185	0	1	0	0	0	0	0	0	1	0	----	2/2		RandomExcursionsVariant
186	0	1	0	1	0	0	0	0	0	0	----	2/2		RandomExcursionsVariant
187	0	1	1	0	0	0	0	0	0	0	----	2/2		RandomExcursionsVariant
188	0	1	0	1	0	0	0	0	0	0	----	2/2		RandomExcursionsVariant
189	0	0	2	0	0	0	0	0	0	0	----	2/2		RandomExcursionsVariant
190	0	0	1	1	0	0	0	0	0	0	----	2/2		RandomExcursionsVariant
191	0	0	1	0	1	0	0	0	0	0	----	2/2		RandomExcursionsVariant
192	0	1	0	0	0	0	1	0	0	0	----	2/2		RandomExcursionsVariant
193	3	0	2	1	0	0	1	0	1	2	0.350485	9/10		Serial
194	2	2	1	1	0	2	0	0	0	2	0.534146	9/10		Serial
195	2	2	1	0	0	1	1	0	2	1	0.739918	10/10		LinearComplexity

196

197

198 -

199 The minimum pass rate for each statistical test with the exception of the

200 random excursion (variant) test is approximately = 8 for a

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
The minimum pass rate for each statistical test with the exception of the
random excursion (variant) test is approximately = 8 for a
sample size = 10 binary sequences.

The minimum pass rate for the random excursion (variant) test
is approximately = 1 for a sample size = 2 binary sequences.

For further guidelines construct a probability table using the MAPLE program
provided in the addendum section of the documentation.
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```