

Diehard-Test PRG310 XOR3 (PTG.2)

IBB, 14.04.2014

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BIRTHDAY SPACINGS TEST, M= 512 N=2**24 LAMBDA= 2.0000
  txor31.rnd      using bits 1 to 24 p-value= .195986
  txor31.rnd      using bits 2 to 25 p-value= .338369
  txor31.rnd      using bits 3 to 26 p-value= .822109
  txor31.rnd      using bits 4 to 27 p-value= .552708
  txor31.rnd      using bits 5 to 28 p-value= .485513
  txor31.rnd      using bits 6 to 29 p-value= .168973
  txor31.rnd      using bits 7 to 30 p-value= .175996
  txor31.rnd      using bits 8 to 31 p-value= .575882
  txor31.rnd      using bits 9 to 32 p-value= .672511

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The 9 p-values were
.195986 .338369 .822109 .552708 .485513
.168973 .175996 .575882 .672511

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A KSTEST for the 9 p-values yields .373947

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      OPERM5 test for file txor31.rnd
chisquare for 99 degrees of freedom=128.691; p-value= .975914
      OPERM5 test for file txor31.rnd
chisquare for 99 degrees of freedom=100.732; p-value= .567393

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Binary rank test for txor31.rnd
  Rank test for 31x31 binary matrices:
  rows from leftmost 31 bits of each 32-bit integer
  rank  observed  expected (o-e)^2/e  sum
  28      195      211.4  1.274968  1.275
  29     5185     5134.0  .506418  1.781
  30    23193    23103.0  .350238  2.132
  31   11427    11551.5  1.342362  3.474

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chisquare= 3.474 for 3 d. of f.; p-value= .707019

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Binary rank test for txor31.rnd
  Rank test for 32x32 binary matrices:
  rows from leftmost 32 bits of each 32-bit integer
  rank  observed  expected (o-e)^2/e  sum
  29      213      211.4  .011838  .012
  30     5123     5134.0  .023612  .035
  31    23107    23103.0  .000676  .036
  32   11557    11551.5  .002596  .039

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chisquare= .039 for 3 d. of f.; p-value= .424004

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b-rank test for bits 1 to 8 p=1-exp(-SUM/2)= .51196
b-rank test for bits 2 to 9 p=1-exp(-SUM/2)= .78315
b-rank test for bits 3 to 10 p=1-exp(-SUM/2)= .72659
b-rank test for bits 4 to 11 p=1-exp(-SUM/2)= .20829
b-rank test for bits 5 to 12 p=1-exp(-SUM/2)= .65123
b-rank test for bits 6 to 13 p=1-exp(-SUM/2)= .46343
b-rank test for bits 7 to 14 p=1-exp(-SUM/2)= .23241
b-rank test for bits 8 to 15 p=1-exp(-SUM/2)= .19469
b-rank test for bits 9 to 16 p=1-exp(-SUM/2)= .95178
b-rank test for bits 10 to 17 p=1-exp(-SUM/2)= .25889
b-rank test for bits 11 to 18 p=1-exp(-SUM/2)= .14477
b-rank test for bits 12 to 19 p=1-exp(-SUM/2)= .80071
b-rank test for bits 13 to 20 p=1-exp(-SUM/2)= .25922
b-rank test for bits 14 to 21 p=1-exp(-SUM/2)= .15694
b-rank test for bits 15 to 22 p=1-exp(-SUM/2)= .92290
b-rank test for bits 16 to 23 p=1-exp(-SUM/2)= .56621
b-rank test for bits 17 to 24 p=1-exp(-SUM/2)= .84236
b-rank test for bits 18 to 25 p=1-exp(-SUM/2)= .28888
b-rank test for bits 19 to 26 p=1-exp(-SUM/2)= .88497
b-rank test for bits 20 to 27 p=1-exp(-SUM/2)= .52665
b-rank test for bits 21 to 28 p=1-exp(-SUM/2)= .81251
b-rank test for bits 22 to 29 p=1-exp(-SUM/2)= .51460
b-rank test for bits 23 to 30 p=1-exp(-SUM/2)= .19954
b-rank test for bits 24 to 31 p=1-exp(-SUM/2)= .14555
b-rank test for bits 25 to 32 p=1-exp(-SUM/2)= .06436

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TEST SUMMARY, 25 tests on 100,000 random 6x8 matrices

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These should be 25 uniform [0,1] random variables:

.511962	.783152	.726593	.208286	.651230
.463434	.232414	.194693	.951776	.258886
.144766	.800715	.259218	.156941	.922896
.566207	.842360	.288878	.884969	.526654
.812511	.514596	.199539	.145555	.064358

brank test summary for txor31.rnd

The KS test for those 25 supposed UNI's yields

KS p-value= .224801

No. missing words should average 141909. with sigma=428.

tst no 1:	141447 missing words,	-1.08 sigmas from mean,	p-value= .14003
tst no 2:	141912 missing words,	.01 sigmas from mean,	p-value= .50249
tst no 3:	142189 missing words,	.65 sigmas from mean,	p-value= .74326
tst no 4:	141766 missing words,	-.33 sigmas from mean,	p-value= .36886
tst no 5:	140947 missing words,	-2.25 sigmas from mean,	p-value= .01227
tst no 6:	142518 missing words,	1.42 sigmas from mean,	p-value= .92251
tst no 7:	142290 missing words,	.89 sigmas from mean,	p-value= .81311
tst no 8:	142327 missing words,	.98 sigmas from mean,	p-value= .83544
tst no 9:	141301 missing words,	-1.42 sigmas from mean,	p-value= .07761
tst no 10:	141455 missing words,	-1.06 sigmas from mean,	p-value= .14423
tst no 11:	142105 missing words,	.46 sigmas from mean,	p-value= .67623
tst no 12:	141720 missing words,	-.44 sigmas from mean,	p-value= .32912
tst no 13:	141696 missing words,	-.50 sigmas from mean,	p-value= .30909
tst no 14:	141751 missing words,	-.37 sigmas from mean,	p-value= .35572
tst no 15:	142446 missing words,	1.25 sigmas from mean,	p-value= .89506
tst no 16:	142092 missing words,	.43 sigmas from mean,	p-value= .66524
tst no 17:	142265 missing words,	.83 sigmas from mean,	p-value= .79702
tst no 18:	141702 missing words,	-.48 sigmas from mean,	p-value= .31405
tst no 19:	141027 missing words,	-2.06 sigmas from mean,	p-value= .01963
tst no 20:	141991 missing words,	.19 sigmas from mean,	p-value= .57567

OPSO for txor31.rnd	using bits 23 to 32	142121	.730	.7673
OPSO for txor31.rnd	using bits 22 to 31	142209	1.033	.8493
OPSO for txor31.rnd	using bits 21 to 30	142189	.964	.8326
OPSO for txor31.rnd	using bits 20 to 29	142221	1.075	.8588
OPSO for txor31.rnd	using bits 19 to 28	142245	1.157	.8765
OPSO for txor31.rnd	using bits 18 to 27	141340	-1.963	.0248
OPSO for txor31.rnd	using bits 17 to 26	141784	-.432	.3328
OPSO for txor31.rnd	using bits 16 to 25	141454	-1.570	.0582
OPSO for txor31.rnd	using bits 15 to 24	141915	.020	.5078
OPSO for txor31.rnd	using bits 14 to 23	142264	1.223	.8893
OPSO for txor31.rnd	using bits 13 to 22	141526	-1.322	.0931
OPSO for txor31.rnd	using bits 12 to 21	142120	.726	.7662
OPSO for txor31.rnd	using bits 11 to 20	142208	1.030	.8485
OPSO for txor31.rnd	using bits 10 to 19	141573	-1.160	.1231
OPSO for txor31.rnd	using bits 9 to 18	142087	.613	.7299
OPSO for txor31.rnd	using bits 8 to 17	141849	-.208	.4176
OPSO for txor31.rnd	using bits 7 to 16	142087	.613	.7299
OPSO for txor31.rnd	using bits 6 to 15	141623	-.987	.1617
OPSO for txor31.rnd	using bits 5 to 14	141945	.123	.5489
OPSO for txor31.rnd	using bits 4 to 13	141910	.002	.5009
OPSO for txor31.rnd	using bits 3 to 12	141710	-.687	.2459
OPSO for txor31.rnd	using bits 2 to 11	141420	-1.687	.0458
OPSO for txor31.rnd	using bits 1 to 10	141302	-2.094	.0181
OQSO for txor31.rnd	using bits 28 to 32	142147	.806	.7898
OQSO for txor31.rnd	using bits 27 to 31	142121	.718	.7635
OQSO for txor31.rnd	using bits 26 to 30	142134	.762	.7769
OQSO for txor31.rnd	using bits 25 to 29	142005	.324	.6271
OQSO for txor31.rnd	using bits 24 to 28	141554	-1.205	.1142
OQSO for txor31.rnd	using bits 23 to 27	141731	-.605	.2728
OQSO for txor31.rnd	using bits 22 to 26	141702	-.703	.2411
OQSO for txor31.rnd	using bits 21 to 25	141788	-.411	.3404
OQSO for txor31.rnd	using bits 20 to 24	141790	-.405	.3429
OQSO for txor31.rnd	using bits 19 to 23	142130	.748	.7728
OQSO for txor31.rnd	using bits 18 to 22	141789	-.408	.3417
OQSO for txor31.rnd	using bits 17 to 21	141854	-.188	.4256
OQSO for txor31.rnd	using bits 16 to 20	141819	-.306	.3797

QQSO for txor31.rnd	using bits 15 to 19	141773	-.462	.3220
QQSO for txor31.rnd	using bits 14 to 18	142286	1.277	.8992
QQSO for txor31.rnd	using bits 13 to 17	142092	.619	.7321
QQSO for txor31.rnd	using bits 12 to 16	141928	.063	.5252
QQSO for txor31.rnd	using bits 11 to 15	141673	-.801	.2115
QQSO for txor31.rnd	using bits 10 to 14	141906	-.011	.4955
QQSO for txor31.rnd	using bits 9 to 13	141806	-.350	.3631
QQSO for txor31.rnd	using bits 8 to 12	142297	1.314	.9056
QQSO for txor31.rnd	using bits 7 to 11	141486	-1.435	.0756
QQSO for txor31.rnd	using bits 6 to 10	141285	-2.116	.0172
QQSO for txor31.rnd	using bits 5 to 9	141894	-.052	.4793
QQSO for txor31.rnd	using bits 4 to 8	141876	-.113	.4550
QQSO for txor31.rnd	using bits 3 to 7	142046	.463	.6784
QQSO for txor31.rnd	using bits 2 to 6	141563	-1.174	.1202
QQSO for txor31.rnd	using bits 1 to 5	142240	1.121	.8688
DNA for txor31.rnd	using bits 31 to 32	142556	1.908	.9718
DNA for txor31.rnd	using bits 30 to 31	141885	-.072	.4714
DNA for txor31.rnd	using bits 29 to 30	141825	-.249	.4018
DNA for txor31.rnd	using bits 28 to 29	142448	1.589	.9440
DNA for txor31.rnd	using bits 27 to 28	142602	2.043	.9795
DNA for txor31.rnd	using bits 26 to 27	141530	-1.119	.1316
DNA for txor31.rnd	using bits 25 to 26	142154	.722	.7648
DNA for txor31.rnd	using bits 24 to 25	141538	-1.095	.1367
DNA for txor31.rnd	using bits 23 to 24	142527	1.822	.9658
DNA for txor31.rnd	using bits 22 to 23	141905	-.013	.4949
DNA for txor31.rnd	using bits 21 to 22	141737	-.508	.3056
DNA for txor31.rnd	using bits 20 to 21	142328	1.235	.8916
DNA for txor31.rnd	using bits 19 to 20	142079	.501	.6916
DNA for txor31.rnd	using bits 18 to 19	141865	-.131	.4480
DNA for txor31.rnd	using bits 17 to 18	141984	.220	.5872
DNA for txor31.rnd	using bits 16 to 17	141999	.265	.6043
DNA for txor31.rnd	using bits 15 to 16	142141	.683	.7528
DNA for txor31.rnd	using bits 14 to 15	141689	-.650	.2579
DNA for txor31.rnd	using bits 13 to 14	141827	-.243	.4041
DNA for txor31.rnd	using bits 12 to 13	142094	.545	.7070
DNA for txor31.rnd	using bits 11 to 12	141475	-1.281	.1001
DNA for txor31.rnd	using bits 10 to 11	141640	-.794	.2135
DNA for txor31.rnd	using bits 9 to 10	142485	1.698	.9553
DNA for txor31.rnd	using bits 8 to 9	142321	1.214	.8877
DNA for txor31.rnd	using bits 7 to 8	142279	1.090	.8622
DNA for txor31.rnd	using bits 6 to 7	142625	2.111	.9826
DNA for txor31.rnd	using bits 5 to 6	142021	.329	.6291
DNA for txor31.rnd	using bits 4 to 5	141929	.058	.5231
DNA for txor31.rnd	using bits 3 to 4	142137	.672	.7491
DNA for txor31.rnd	using bits 2 to 3	141966	.167	.5664
DNA for txor31.rnd	using bits 1 to 2	141893	-.048	.4808

Test results for txor31.rnd

Chi-square with $5^5-5^4=2500$ d.of f. for sample size:2560000

chisquare equiv normal p-value

Results fo COUNT-THE-1's in successive bytes:

byte stream for txor31.rnd	2451.77	-.682	.247606
byte stream for txor31.rnd	2586.36	1.221	.889025

Chi-square with $5^5-5^4=2500$ d.of f. for sample size: 256000

chisquare equiv normal p value

Results for COUNT-THE-1's in specified bytes:

bits 1 to 8	2554.41	.769	.779186
bits 2 to 9	2383.85	-1.643	.050229
bits 3 to 10	2596.55	1.365	.913949
bits 4 to 11	2350.40	-2.116	.017188
bits 5 to 12	2534.00	.481	.684707
bits 6 to 13	2646.63	2.074	.980947
bits 7 to 14	2500.68	.010	.503834
bits 8 to 15	2549.95	.706	.760013
bits 9 to 16	2499.81	-.003	.498939
bits 10 to 17	2644.48	2.043	.979488
bits 11 to 18	2395.38	-1.480	.069501

bits 12 to 19	2434.32	-.929	.176498
bits 13 to 20	2488.83	-.158	.437256
bits 14 to 21	2472.62	-.387	.349318
bits 15 to 22	2534.66	.490	.688006
bits 16 to 23	2364.44	-1.917	.027612
bits 17 to 24	2340.96	-2.249	.012250
bits 18 to 25	2358.68	-1.999	.022827
bits 19 to 26	2440.67	-.839	.200735
bits 20 to 27	2611.72	1.580	.942941
bits 21 to 28	2545.30	.641	.739115
bits 22 to 29	2576.72	1.085	.861032
bits 23 to 30	2491.34	-.122	.451252
bits 24 to 31	2510.02	.142	.556355
bits 25 to 32	2506.41	.091	.536090

CDPARK: result of ten tests on file txor31.rnd
Of 12,000 tries, the average no. of successes
should be 3523 with sigma=21.9

Successes: 3493	z-score: -1.370	p-value: .085365
Successes: 3489	z-score: -1.553	p-value: .060270
Successes: 3513	z-score: -.457	p-value: .323972
Successes: 3544	z-score: .959	p-value: .831196
Successes: 3545	z-score: 1.005	p-value: .842447
Successes: 3517	z-score: -.274	p-value: .392053
Successes: 3554	z-score: 1.416	p-value: .921543
Successes: 3520	z-score: -.137	p-value: .445521
Successes: 3488	z-score: -1.598	p-value: .055002
Successes: 3543	z-score: .913	p-value: .819442

square size	avg. no. parked	sample sigma
100.	3520.600	23.792

KSTEST for the above 10: p= .439468

This is the MINIMUM DISTANCE test
for random integers in the file txor31.rnd

Sample no.	d^2	avg	equiv uni
5	.5432	.7654	.420709
10	.1018	.9158	.097233
15	.2678	.7282	.235936
20	.4303	.8238	.351100
25	.6262	.8366	.467042
30	.2390	.8186	.213496
35	1.3000	.8518	.729239
40	.8133	.8434	.558403
45	3.2305	.9063	.961099
50	2.1482	.8731	.884558
55	.1219	.8276	.115296
60	.3318	.7950	.283566
65	1.0280	.8026	.644117
70	.1337	.7940	.125725
75	.2283	.7971	.205048
80	.7803	.8163	.543518
85	.1671	.7986	.154622
90	1.8595	.8172	.845704
95	.3760	.8572	.314713
100	.5991	.8898	.452359

MINIMUM DISTANCE TEST for txor31.rnd
Result of KS test on 20 transformed mindist^2's:
p-value= .649265

The 3DSPHERES test for file txor31.rnd

sample no: 1	r^3= 35.086	p-value= .68949
sample no: 2	r^3= 1.973	p-value= .06365
sample no: 3	r^3= 50.495	p-value= .81421
sample no: 4	r^3= 14.313	p-value= .37942
sample no: 5	r^3= 21.767	p-value= .51595
sample no: 6	r^3= 7.731	p-value= .22717
sample no: 7	r^3= 8.280	p-value= .24119

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sample no: 8      r^3= 43.583      p-value= .76608
sample no: 9      r^3= 33.043      p-value= .66760
sample no: 10     r^3= 61.857      p-value= .87279
sample no: 11     r^3= 7.526       p-value= .22187
sample no: 12     r^3= 3.156       p-value= .09987
sample no: 13     r^3= 63.657      p-value= .88020
sample no: 14     r^3= 23.257      p-value= .53940
sample no: 15     r^3= 19.002      p-value= .46922
sample no: 16     r^3= 37.331      p-value= .71187
sample no: 17     r^3= 1.490       p-value= .04846
sample no: 18     r^3= 10.115     p-value= .28621
sample no: 19     r^3= 70.497     p-value= .90462
sample no: 20     r^3= 13.177     p-value= .35547

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3DSPHERES test for file txor31.rnd p-value= .016657

RESULTS OF SQUEEZE TEST FOR txor31.rnd

Table of standardized frequency counts
 ((obs-exp)/sqrt(exp))^2
 for j taking values <=6,7,8,...,47,>=48:

-.1	.1	-.1	-1.1	.6	-1.2
.2	1.0	.6	.9	1.0	.5
1.1	-1.0	-.3	-1.7	1.5	-.4
-.2	-2.3	1.2	-.6	.0	.3
-.7	1.0	-.8	.2	2.2	-.4
-.1	.5	.3	1.3	-2.6	.2
-.5	1.8	1.7	2.6	.9	.0
-.1					

Chi-square with 42 degrees of freedom: 50.882
 z-score= .969 p-value= .836605

Test no. 1	p-value	.624147
Test no. 2	p-value	.267578
Test no. 3	p-value	.828417
Test no. 4	p-value	.120206
Test no. 5	p-value	.305537
Test no. 6	p-value	.204557
Test no. 7	p-value	.734314
Test no. 8	p-value	.986381
Test no. 9	p-value	.746076
Test no. 10	p-value	.949889

Results of the OSUM test for txor31.rnd
 KSTEST on the above 10 p-values: .464947

The RUNS test for file txor31.rnd
 Up and down runs in a sample of 10000

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Run test for txor31.rnd      :
runs up; ks test for 10 p's: .567662
runs down; ks test for 10 p's: .798607
Run test for txor31.rnd      :
runs up; ks test for 10 p's: .717666
runs down; ks test for 10 p's: .404089

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Results of craps test for txor31.rnd

No. of wins:	Observed	Expected		
	98539	98585.86		

Chisq= 25.60 for 20 degrees of freedom, p= .82046

Throws	Observed	Expected	Chisq	Sum

SUMMARY FOR txor31.rnd
 p-value for no. of wins: .416997
 p-value for throws/game: .820463

Test completed. File txor31.rnd

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