```
 BIRTHDAY SPACINGS TEST, M= 512 N=2**24 LAMBDA=  2.0000
           p1.dat          using bits  1 to 24 p-value=  .370851
           p1.dat          using bits  2 to 25 p-value=  .215756
           p1.dat          using bits  3 to 26 p-value=  .316874
           p1.dat          using bits  4 to 27 p-value=  .889222
           p1.dat          using bits  5 to 28 p-value=  .350660
           p1.dat          using bits  6 to 29 p-value=  .062189
           p1.dat          using bits  7 to 30 p-value=  .607847
           p1.dat          using bits  8 to 31 p-value=  .652257
           p1.dat          using bits  9 to 32 p-value=  .547244
   The 9 p-values were
        .370851   .215756   .316874   .889222   .350660
        .062189   .607847   .652257   .547244
  A KSTEST for the 9 p-values yields  .208153
-------------------------------------------------------------------------------
           OPERM5 test for file p1.dat
 chisquare for 99 degrees of freedom= 91.273; p-value= .302673
           OPERM5 test for file p1.dat
 chisquare for 99 degrees of freedom=118.737; p-value= .914021
-------------------------------------------------------------------------------
    Binary rank test for p1.dat
         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       211     211.4   .000826     .001
        29      5036    5134.0  1.871054    1.872
        30     23141   23103.0   .062348    1.934
        31     11612   11551.5   .316607    2.251
  chisquare= 2.251 for 3 d. of f.; p-value= .544767
    Binary rank test for p1.dat
         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       220     211.4   .348364     .348
        30      5119    5134.0   .043885     .392
        31     23007   23103.0   .399298     .792
        32     11654   11551.5   .909079    1.701
  chisquare= 1.701 for 3 d. of f.; p-value= .459309
-------------------------------------------------------------------------------
 b-rank test for bits  1 to  8 p=1-exp(-SUM/2)= .89853
 b-rank test for bits  2 to  9 p=1-exp(-SUM/2)= .29341
 b-rank test for bits  3 to 10 p=1-exp(-SUM/2)= .84986
 b-rank test for bits  4 to 11 p=1-exp(-SUM/2)= .75348
 b-rank test for bits  5 to 12 p=1-exp(-SUM/2)= .25847
 b-rank test for bits  6 to 13 p=1-exp(-SUM/2)= .59401
 b-rank test for bits  7 to 14 p=1-exp(-SUM/2)= .68370
 b-rank test for bits  8 to 15 p=1-exp(-SUM/2)= .27987
 b-rank test for bits  9 to 16 p=1-exp(-SUM/2)= .20319
 b-rank test for bits 10 to 17 p=1-exp(-SUM/2)= .27888
 b-rank test for bits 11 to 18 p=1-exp(-SUM/2)= .97016
 b-rank test for bits 12 to 19 p=1-exp(-SUM/2)= .75452
 b-rank test for bits 13 to 20 p=1-exp(-SUM/2)= .54506
 b-rank test for bits 14 to 21 p=1-exp(-SUM/2)= .21427
 b-rank test for bits 15 to 22 p=1-exp(-SUM/2)= .38155
 b-rank test for bits 16 to 23 p=1-exp(-SUM/2)= .58030
 b-rank test for bits 17 to 24 p=1-exp(-SUM/2)= .50947
 b-rank test for bits 18 to 25 p=1-exp(-SUM/2)= .16789
 b-rank test for bits 19 to 26 p=1-exp(-SUM/2)= .33869
 b-rank test for bits 20 to 27 p=1-exp(-SUM/2)= .94153
 b-rank test for bits 21 to 28 p=1-exp(-SUM/2)= .55683
 b-rank test for bits 22 to 29 p=1-exp(-SUM/2)= .99303
 b-rank test for bits 23 to 30 p=1-exp(-SUM/2)= .39534
 b-rank test for bits 24 to 31 p=1-exp(-SUM/2)= .10802
 b-rank test for bits 25 to 32 p=1-exp(-SUM/2)= .11429
```

```
  TEST SUMMARY, 25 tests on 100,000 random 6x8 matrices
 These should be 25 uniform [0,1] random variables:
     .898533     .293408     .849862     .753484     .258474
     .594014     .683699     .279869     .203192     .278877
     .970157     .754522     .545062     .214268     .381552
     .580297     .509471     .167891     .338689     .941533
     .556828     .993033     .395341     .108016     .114292
   brank test summary for p1.dat
       The KS test for those 25 supposed UNI's yields
                  KS p-value= .186105
-------------------------------------------------------------------------------
  No. missing words should average  141909. with sigma=428.
 tst no  1:  141397 missing words,   -1.20 sigmas from mean, p-value= .11565
 tst no  2:  141423 missing words,   -1.14 sigmas from mean, p-value= .12792
 tst no  3:  142146 missing words,     .55 sigmas from mean, p-value= .70986
 tst no  4:  142974 missing words,    2.49 sigmas from mean, p-value= .99357
 tst no  5:  141358 missing words,   -1.29 sigmas from mean, p-value= .09885
 tst no  6:  141860 missing words,    -.12 sigmas from mean, p-value= .45412
 tst no  7:  142210 missing words,     .70 sigmas from mean, p-value= .75882
 tst no  8:  142457 missing words,    1.28 sigmas from mean, p-value= .89966
 tst no  9:  141994 missing words,     .20 sigmas from mean, p-value= .57841
 tst no 10:  141155 missing words,   -1.76 sigmas from mean, p-value= .03900
 tst no 11:  141334 missing words,   -1.34 sigmas from mean, p-value= .08944
 tst no 12:  141913 missing words,     .01 sigmas from mean, p-value= .50342
 tst no 13:  142218 missing words,     .72 sigmas from mean, p-value= .76461
 tst no 14:  141694 missing words,    -.50 sigmas from mean, p-value= .30745
 tst no 15:  141824 missing words,    -.20 sigmas from mean, p-value= .42099
 tst no 16:  142147 missing words,     .56 sigmas from mean, p-value= .71066
 tst no 17:  142188 missing words,     .65 sigmas from mean, p-value= .74251
 tst no 18:  142020 missing words,     .26 sigmas from mean, p-value= .60202
 tst no 19:  140804 missing words,   -2.58 sigmas from mean, p-value= .00490
 tst no 20:  142173 missing words,     .62 sigmas from mean, p-value= .73107
-------------------------------------------------------------------------------
    OPSO for p1.dat          using bits 23 to 32        141557 -1.215  .1122
    OPSO for p1.dat          using bits 22 to 31        142183   .944  .8273
    OPSO for p1.dat          using bits 21 to 30        141500 -1.411  .0791
    OPSO for p1.dat          using bits 20 to 29        141376 -1.839  .0330
    OPSO for p1.dat          using bits 19 to 28        142087   .613  .7299
    OPSO for p1.dat          using bits 18 to 27        141915   .020  .5078
    OPSO for p1.dat          using bits 17 to 26        141618 -1.005  .1575
    OPSO for p1.dat          using bits 16 to 25        141780  -.446  .3278
    OPSO for p1.dat          using bits 15 to 24        141813  -.332  .3699
    OPSO for p1.dat          using bits 14 to 23        141696  -.736  .2310
    OPSO for p1.dat          using bits 13 to 22        141707  -.698  .2427
    OPSO for p1.dat          using bits 12 to 21        141876  -.115  .4543
    OPSO for p1.dat          using bits 11 to 20        142035   .433  .6676
    OPSO for p1.dat          using bits 10 to 19        142071   .557  .7114
    OPSO for p1.dat          using bits  9 to 18        141783  -.436  .3316
    OPSO for p1.dat          using bits  8 to 17        141660  -.860  .1950
    OPSO for p1.dat          using bits  7 to 16        141561 -1.201  .1149
    OPSO for p1.dat          using bits  6 to 15        141858  -.177  .4298
    OPSO for p1.dat          using bits  5 to 14        141544 -1.260  .1039
    OPSO for p1.dat          using bits  4 to 13        141711  -.684  .2470
    OPSO for p1.dat          using bits  3 to 12        141798  -.384  .3505
    OPSO for p1.dat          using bits  2 to 11        142128   .754  .7746
    OPSO for p1.dat          using bits  1 to 10        141815  -.325  .3725
    OQSO for p1.dat          using bits 28 to 32        142014   .355  .6386
    OQSO for p1.dat          using bits 27 to 31        142192   .958  .8310
    OQSO for p1.dat          using bits 26 to 30        141868  -.140  .4443
    OQSO for p1.dat          using bits 25 to 29        141543 -1.242  .1072
    OQSO for p1.dat          using bits 24 to 28        141875  -.116  .4537
    OQSO for p1.dat          using bits 23 to 27        141476 -1.469  .0709
    OQSO for p1.dat          using bits 22 to 26        142157   .840  .7994
    OQSO for p1.dat          using bits 21 to 25        142206  1.006  .8427
```

```
   OQSO for p1.dat          using bits 20 to 24        141603 -1.038  .1495
   OQSO for p1.dat          using bits 19 to 23        142072   .551  .7093
   OQSO for p1.dat          using bits 18 to 22        141706  -.689  .2453
   OQSO for p1.dat          using bits 17 to 21        142345  1.477  .9301
   OQSO for p1.dat          using bits 16 to 20        141545 -1.235  .1084
   OQSO for p1.dat          using bits 15 to 19        141844  -.221  .4124
   OQSO for p1.dat          using bits 14 to 18        141920   .036  .5144
   OQSO for p1.dat          using bits 13 to 17        142052   .484  .6857
   OQSO for p1.dat          using bits 12 to 16        141721  -.638  .2616
   OQSO for p1.dat          using bits 11 to 15        141902  -.025  .4901
   OQSO for p1.dat          using bits 10 to 14        141833  -.259  .3979
   OQSO for p1.dat          using bits  9 to 13        142011   .345  .6348
   OQSO for p1.dat          using bits  8 to 12        141672  -.805  .2106
   OQSO for p1.dat          using bits  7 to 11        142074   .558  .7116
   OQSO for p1.dat          using bits  6 to 10        142132   .755  .7748
   OQSO for p1.dat          using bits  5 to  9        141877  -.110  .4564
   OQSO for p1.dat          using bits  4 to  8        142298  1.318  .9062
   OQSO for p1.dat          using bits  3 to  7        142249  1.151  .8752
   OQSO for p1.dat          using bits  2 to  6        141726  -.621  .2672
   OQSO for p1.dat          using bits  1 to  5        142052   .484  .6857
    DNA for p1.dat          using bits 31 to 32        141978   .203  .5803
    DNA for p1.dat          using bits 30 to 31        141656  -.747  .2274
    DNA for p1.dat          using bits 29 to 30        141714  -.576  .2822
    DNA for p1.dat          using bits 28 to 29        141317 -1.747  .0403
    DNA for p1.dat          using bits 27 to 28        141782  -.376  .3536
    DNA for p1.dat          using bits 26 to 27        141815  -.278  .3904
    DNA for p1.dat          using bits 25 to 26        141803  -.314  .3769
    DNA for p1.dat          using bits 24 to 25        141949   .117  .5466
    DNA for p1.dat          using bits 23 to 24        141794  -.340  .3669
    DNA for p1.dat          using bits 22 to 23        142057   .436  .6684
    DNA for p1.dat          using bits 21 to 22        141529 -1.122  .1309
    DNA for p1.dat          using bits 20 to 21        141907  -.007  .4973
    DNA for p1.dat          using bits 19 to 20        141800  -.323  .3735
    DNA for p1.dat          using bits 18 to 19        142088   .527  .7009
    DNA for p1.dat          using bits 17 to 18        142144   .692  .7556
    DNA for p1.dat          using bits 16 to 17        141748  -.476  .3171
    DNA for p1.dat          using bits 15 to 16        142333  1.250  .8943
    DNA for p1.dat          using bits 14 to 15        142040   .385  .6501
    DNA for p1.dat          using bits 13 to 14        141972   .185  .5733
    DNA for p1.dat          using bits 12 to 13        142179   .795  .7868
    DNA for p1.dat          using bits 11 to 12        142032   .362  .6413
    DNA for p1.dat          using bits 10 to 11        142227   .937  .8256
    DNA for p1.dat          using bits  9 to 10        142717  2.383  .9914
    DNA for p1.dat          using bits  8 to  9        141973   .188  .5745
    DNA for p1.dat          using bits  7 to  8        142093   .542  .7060
    DNA for p1.dat          using bits  6 to  7        141962   .155  .5617
    DNA for p1.dat          using bits  5 to  6        142090   .533  .7030
    DNA for p1.dat          using bits  4 to  5        141859  -.148  .4410
    DNA for p1.dat          using bits  3 to  4        141884  -.075  .4702
    DNA for p1.dat          using bits  2 to  3        141839  -.207  .4178
    DNA for p1.dat          using bits  1 to  2        142669  2.241  .9875
------------------------------------------------------------------------------
   Test results for p1.dat
 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 p1.dat           2451.70      -.683      .247292
 byte stream for p1.dat           2488.22      -.167      .433860
------------------------------------------------------------------------------
 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  2568.46       .968      .833523
           bits  2 to  9  2487.05      -.183      .427346
```

```
          bits  3 to 10  2659.55      2.256      .987978
          bits  4 to 11  2445.20      -.775      .219168
          bits  5 to 12  2460.31      -.561      .287306
          bits  6 to 13  2436.11      -.904      .183121
          bits  7 to 14  2472.24      -.393      .347316
          bits  8 to 15  2414.64     -1.207      .113675
          bits  9 to 16  2647.43      2.085      .981461
          bits 10 to 17  2551.79       .732      .768046
          bits 11 to 18  2442.73      -.810      .209010
          bits 12 to 19  2641.44      2.000      .977263
          bits 13 to 20  2463.11      -.522      .300938
          bits 14 to 21  2569.91       .989      .838575
          bits 15 to 22  2549.33       .698      .757285
          bits 16 to 23  2424.13     -1.073      .141651
          bits 17 to 24  2466.28      -.477      .316743
          bits 18 to 25  2563.88       .903      .816833
          bits 19 to 26  2571.06      1.005      .842527
          bits 20 to 27  2476.88      -.327      .371860
          bits 21 to 28  2583.73      1.184      .881809
          bits 22 to 29  2512.72       .180      .571395
          bits 23 to 30  2417.89     -1.161      .122785
          bits 24 to 31  2536.37       .514      .696517
          bits 25 to 32  2468.34      -.448      .327146
------------------------------------------------------------------------------
          CDPARK: result of ten tests on file p1.dat
           Of 12,000 tries, the average no. of successes
                should be 3523 with sigma=21.9
           Successes: 3509    z-score:  -.639 p-value: .261324
           Successes: 3515    z-score:  -.365 p-value: .357445
           Successes: 3532    z-score:   .411 p-value: .659449
           Successes: 3565    z-score:  1.918 p-value: .972432
           Successes: 3519    z-score:  -.183 p-value: .427537
           Successes: 3516    z-score:  -.320 p-value: .374623
           Successes: 3516    z-score:  -.320 p-value: .374623
           Successes: 3505    z-score:  -.822 p-value: .205562
           Successes: 3515    z-score:  -.365 p-value: .357445
           Successes: 3513    z-score:  -.457 p-value: .323972

          square size   avg. no.  parked   sample sigma
            100.           3520.500       16.240
           KSTEST for the above 10: p=  .817662
------------------------------------------------------------------------------
              This is the MINIMUM DISTANCE test
             for random integers in the file p1.dat
     Sample no.    d^2     avg     equiv uni
           5     .1704   1.6415     .157410
          10     .0613   1.2715     .059791
          15    1.6865   1.1795     .816401
          20    1.5718   1.1843     .793972
          25     .2249   1.0671     .202335
          30     .2904   1.0837     .253114
          35     .0030    .9821     .003028
          40     .2748    .9185     .241304
          45     .1062    .8946     .101279
          50     .1823   1.0019     .167434
          55    1.7576   1.0654     .829054
          60    1.2677   1.1727     .720313
          65     .2969   1.1740     .257977
          70     .0947   1.1177     .090776
          75     .4955   1.1595     .392252
          80     .4255   1.1611     .347952
          85     .5641   1.1379     .432739
          90     .9233   1.1352     .604616
          95     .0362   1.1013     .035760
```

```
        100     .8183   1.0722     .560628
    MINIMUM DISTANCE TEST for p1.dat
         Result of KS test on 20 transformed mindist^2's:
                                 p-value= .047789
------------------------------------------------------------------------------
              The 3DSPHERES test for file p1.dat
 sample no:  1     r^3=  42.868     p-value= .76043
 sample no:  2     r^3=  47.717     p-value= .79619
 sample no:  3     r^3=  31.331     p-value= .64809
 sample no:  4     r^3=  17.746     p-value= .44653
 sample no:  5     r^3=   6.163     p-value= .18569
 sample no:  6     r^3=  21.450     p-value= .51081
 sample no:  7     r^3=   3.724     p-value= .11674
 sample no:  8     r^3=  44.547     p-value= .77347
 sample no:  9     r^3=  15.750     p-value= .40844
 sample no: 10     r^3=  11.810     p-value= .32543
 sample no: 11     r^3=  43.532     p-value= .76568
 sample no: 12     r^3=  11.296     p-value= .31376
 sample no: 13     r^3=  21.514     p-value= .51184
 sample no: 14     r^3= 104.218     p-value= .96901
 sample no: 15     r^3=  98.567     p-value= .96258
 sample no: 16     r^3=  29.966     p-value= .63170
 sample no: 17     r^3= 113.142     p-value= .97698
 sample no: 18     r^3=  29.689     p-value= .62828
 sample no: 19     r^3=  28.583     p-value= .61433
 sample no: 20     r^3=  62.310     p-value= .87470
      3DSPHERES test for file p1.dat              p-value= .869358
------------------------------------------------------------------------------
           RESULTS OF SQUEEZE TEST FOR p1.dat
         Table of standardized frequency counts
    ( (obs-exp)/sqrt(exp) )^2
       for j taking values <=6,7,8,...,47,>=48:
    -.8     -.3      .1     -.4     -.7     1.8
   -1.6     -.6      .1    -1.2     -.2     -.6
     .2     1.2      .6     -.9     -.7      .9
     .2     -.3     1.6      .7      .0     -.3
   -1.7     -.6     -.1      .7      .8     -.2
    -.9     -.6      .9     -.1      .1    -2.5
    1.2     -.7      .5     -.1    -1.3    -1.0
    -.1
          Chi-square with 42 degrees of freedom: 34.305
             z-score=  -.840  p-value= .204952
_____________________________________________________________________
------------------------------------------------------------------------------
               Test no.  1      p-value  .696666
               Test no.  2      p-value  .833289
               Test no.  3      p-value  .310380
               Test no.  4      p-value  .101635
               Test no.  5      p-value  .379390
               Test no.  6      p-value  .317574
               Test no.  7      p-value  .058812
               Test no.  8      p-value  .435704
               Test no.  9      p-value  .918404
               Test no. 10      p-value  .607877
  Results of the OSUM test for p1.dat
       KSTEST on the above 10 p-values:  .022445
------------------------------------------------------------------------------
          The RUNS test for file p1.dat
    Up and down runs in a sample of 10000
_____________________________________________
                Run test for p1.dat         :
      runs up; ks test for 10 p's: .824983
    runs down; ks test for 10 p's: .436367
                Run test for p1.dat         :
```

```
       runs up; ks test for 10 p's: .282614
     runs down; ks test for 10 p's: .323014
------------------------------------------------------------------------------
                Results of craps test for p1.dat
  No. of wins:  Observed Expected
                               98588    98585.86
 Chisq=  20.17 for 20 degrees of freedom, p=  .55244
               Throws Observed Expected  Chisq     Sum
            SUMMARY  FOR p1.dat
                p-value for no. of wins: .503819
                p-value for throws/game: .552443
  Test completed.  File p1.dat
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
:
```