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2 RELIABILITY DEMONSTRATION FOR BERNOULLI TRIALS (BERNOULLI.BAS)
3 ORIGINAL DATE: Circa 1985
4 REVISION DATE: October 25, 2020
5 AUTHOR: Phil Rutherford
6 RUN DATE: 25-10-2020 (DD-MM-YYYY)
7 RUN TIME: 22:27:42
8 RUN WITH MMBASIC.EXE (www.mmbasic.com)
9
10 RELIABILITY DEMONSTRATION USING BERNOULLI TRIALS. CALCULATES
11 THE NUMBER OF TRIALS FOR A GIVEN NUMBER OF FAILURES, OR THE
12 NUMBER OF FAILURES FOR A GIVEN NUMBER OF TRIALS. INPUT DESIRED
13 RELIABILITY TO BE DEMONSTRATED AT A SPECIFIC CONFIDENCE LEVEL
14 AND PRODUCER'S RISK.
15 * CONSUMER'S RISK -- TRUE RELIABILITY < DESIRED RELIABILITY
16 * PRODUCER'S RISK -- TRUE RELIABILITY > DESIRED RELIABILITY
17
18 TEST PROGRAM REQUIREMENTS
19
20 ESTIMATED NO. OF TRIALS           ? 100
21 ESTIMATED NO. OF FAILURES         ? 1
22 DEMONSTRATED RELIABILITY           ? 0.95
23 CONFIDENCE LEVEL (%)              ? 90
24 CONSUMER'S RISK GOAL (%)          10
25 PRODUCER'S RISK GOAL (%)          ? 10
26 ITERATE ON TRIALS (T) OR FAILURES (F) ? F
27
28 ITERATIVE DETERMINATION OF NEEDED TEST PROGRAM
29 ITERATE ON NUMBER OF FAILURES
30
31 TRIALS    FAILURES    DEMONSTRATED    CONFIDENCE    CONSUMER'S
32           FAILURES    RELIABILITY     LEVEL (%)     RISK (%)
33
34 100       1           0.95           96.29187907  3.708120933
35 100       2           0.95           88.17370188  11.82629812
36 100       1           0.95           96.29187907  3.708120933
37
38 PRODUCER'S    TRUE
39 RISK (%)     RELIABILITY
40
41 96.29187907  0.95
42 95.95329753  0.951
43 95.58554832  0.952
44 95.18633183  0.953
45 94.75319443  0.954
46 94.28352193  0.955
47 93.77453345  0.956
48 93.22327571  0.957
49 92.62661796  0.958
50 91.98124787  0.959
51 91.28366833  0.96
52 90.53019578  0.961
53 89.71696006  0.962
54 88.8399063   0.963
55 87.89479936  0.964
56 86.87723099  0.965
57 85.78263063  0.966
58 84.6062802   0.967
59 83.34333375  0.968
60 81.98884275  0.969
61 80.53778799  0.97
62 78.98511914  0.971
63 77.3258032   0.972
64 75.5548833   0.973
65 73.66754934  0.974
66 71.65922233  0.975

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|    |             |         |
|----|-------------|---------|
| 67 | 69.5256545  | 0.976   |
| 68 | 67.2630474  | 0.977   |
| 69 | 64.86819069 | 0.978   |
| 70 | 62.33862452 | 0.979   |
| 71 | 59.67282892 | 0.98    |
| 72 | 56.87044384 | 0.981   |
| 73 | 53.93252418 | 0.982   |
| 74 | 50.86183457 | 0.983   |
| 75 | 47.66318931 | 0.984   |
| 76 | 44.3438434  | 0.985   |
| 77 | 40.91394172 | 0.986   |
| 78 | 37.38703372 | 0.987   |
| 79 | 33.78066245 | 0.988   |
| 80 | 30.11703739 | 0.989   |
| 81 | 26.42380211 | 0.99    |
| 82 | 22.73490856 | 0.991   |
| 83 | 19.09161198 | 0.992   |
| 84 | 15.54360122 | 0.993   |
| 85 | 12.15028187 | 0.994   |
| 86 | 8.982230899 | 0.995   |
| 87 | 9.286630707 | 0.9949  |
| 88 | 9.594015557 | 0.9948  |
| 89 | 9.904297378 | 0.9947  |
| 90 | 10.21738952 | 0.9946  |
| 91 | 9.904297378 | 0.9947  |
| 92 | 9.935481545 | 0.99469 |
| 93 | 9.966693729 | 0.99468 |
| 94 | 9.997933843 | 0.99467 |
| 95 | 10.0292018  | 0.99466 |
| 96 | 9.997933843 | 0.99467 |

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REQUIRED TEST PROGRAM SUMMARY

|     |                      |             |
|-----|----------------------|-------------|
| 100 | TRIALS               | 100         |
| 101 | FAILURES             | 1           |
| 102 | REQUIRED RELIABILITY | 0.95        |
| 103 | CONFIDENCE LEVEL (%) | 96.29187907 |
| 104 | CONSUMER'S RISK (%)  | 3.708120933 |
| 105 | PRODUCER'S RISK (%)  | 9.997933843 |
| 106 | TRUE RELIABILITY     | 0.99467     |

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