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1 10 '-----
2 15 ' SCOREGEN.BAS
3 16 ' GENERIC COMPONENTS
4 20 '-----
5 25 CLS
6 26 Print
7 30 Print " SCOREGEN ... GENERIC COMPONENTS"
8 31 Print " ORIGINAL DATE: Circa 1985"
9 32 Print " REVISION DATE: October 22, 2020"
10 33 Print " AUTHOR: Phil Rutherford"
11 34 Print " RUN DATE: ";Date$;
12 35 Print " (DD-MM-YYYY)
13 36 Print " RUN TIME: ";TIME$
14 37 Print " RUN WITH MMBASIC (www.mmbasic.com)"
15 38 Print
16 40 '-----
17 45 'INPUT DATA
18 46 '-----
19 47 Print " MODELS COMMOM CAUSE FAILURES IN PARALLEL REPLICATE OR DIVERSE REDUNDANT"
20 48 Print " SYSTEMS USING VARYING DEGREES OF STATISTICAL CORRELATION"
21 49 Print
22 58 Input " INPUT MAXIMUM NO. OF PARALLEL COMPONENTS";KMAX
23 59 Input " INPUT COMPONENT UNAVAILABILITY";Q
24 60 Input " ARE COMPONENTS REPLICATE (R) OR DIVERSE (D). USE CAPS";RD$
25 61 Print " DEGREE OF DEPENCEENCE"
26 62 Input " ZERO (Z), SMALL (S), MODERATE (M), LARGE (L) OR COMPLETE (C). USE CAPS";D$
27 63 IF RD$="R" AND D$="Z" THEN S=0.0
28 64 If RD$="R" And D$="S" Then S=0.3
29 65 If RD$="R" And D$="M" Then S=0.4
30 66 IF RD$="R" AND D$="L" THEN S=0.5
31 67 IF RD$="R" AND D$="C" THEN S=1.0
32 73 If RD$="D" And D$="Z" Then S=0.0
33 74 If RD$="D" And D$="S" Then S=0.001
34 75 IF RD$="D" AND D$="M" THEN S=0.01
35 76 IF RD$="D" AND D$="L" THEN S=0.1
36 77 IF RD$="D" AND D$="C" THEN S=1.0
37 80 IF D$="Z" THEN V=0.0
38 82 IF D$="S" THEN V=0.1
39 84 IF D$="M" THEN V=0.15
40 86 IF D$="L" THEN V=0.2
41 88 IF D$="C" THEN V=1.0
42 92 READ APPROX$
43 93 DATA "N"
44 130 PRINT
45 140 If RD$="R" Then Print " COMPONENTS ARE REPLICATE" Else Print " COMPONENTS ARE
DIVERSE"
46 141 If D$="Z" Then Print " COMPONENTS HAVE ZERO DEPENCEENCE"
47 142 If D$="S" Then Print " COMPONENTS HAVE SMALL DEPENCEENCE"
48 143 If D$="M" Then Print " COMPONENTS HAVE MODERATE DEPENCEENCE"
49 144 If D$="L" Then Print " COMPONENTS HAVE LARGE DEPENCEENCE"
50 145 If D$="C" Then Print " COMPONENTS HAVE COMPLETE (100%) DEPENCEENCE"
51 146 Print " NORMALIZED CORRELATION COEFFICIENT =" ;S
52 150 Print " NORMALIZED VARIANCE =" ;V
53 155 PRINT
54 160 Dim PRI(KMAX)
55 161 Dim PRC(KMAX)
56 162 DIM COMBIN(KMAX,KMAX)
57 163 DIM RSI(KMAX)
58 164 DIM RSC(KMAX)
59 165 DIM DRSI(KMAX)
60 166 DIM DRSC(KMAX)
61 170 Print " NUMBER OF PARALLEL COMPONENTS =" ;KMAX
62 172 PRINT
63 174 Print " COMPONENT UNAVAILABILITY =" ;Q
64 255 '-----
65 260 'COMPUTE COMBINATIONS

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66 265 '-----
67 269 COMBIN(0,0)=1
68 270 FOR K=1 TO KMAX
69 272 COMBIN(1,K)=K
70 273 COMBIN(0,K)=1
71 274 COMBIN(K,K)=1
72 276 NEXT K
73 278 FOR K=3 TO KMAX
74 280 FOR J=2 TO K
75 282 IF (K-J)<J THEN COMBIN(J,K)=COMBIN(K-J,K) : GOTO 286
76 284 COMBIN(J,K)=COMBIN(J-1,K-1)+COMBIN(J,K-1)
77 286 NEXT J
78 288 NEXT K
79 500 '-----
80 505 ' >=J-OUT-OF-K SYSTEM
81 510 '-----
82 515 K=KMAX
83 520 GOSUB 2000
84 610 GOSUB 1000
85 620 Print
86 997 Input " ";QUIT
87 999 End
88 1000 '-----
89 1010 'SUBROUTINE TO COMPUTE DOUBLE BINOMIAL EXPANSION
90 1020 '-----
91 1030 Print
92 1040 Print Chr$(13);" SYSTEM LOGIC";Space$(10);"----- SYSTEM UNAVAILABILITY
-----"
93 1050 Print TAB(29);"INDEPENDENT";TAB(54);"CORRELATED"
94 1055 PRINT
95 1060 FOR J=0 TO K
96 1061 RSI(J)=0
97 1062 RSC(J)=0
98 1063 DRSI(J)=0
99 1064 DRSC(J)=0
100 1065 If APPROX$="Y" Then RSI(J)=COMBIN(J,K)*PRI(J)*((1-1*PRI(1))^(K-J)) :
RSC(J)=COMBIN(J,K)*PRC(J) : Goto 1150
101 1070 FOR I=0 TO K-J
102 1080 XX=(-1)^I*COMBIN(I,K-J)
103 1090 RSI(J)=RSI(J)+PRI(J+I)*XX
104 1100 RSC(J)=RSC(J)+PRC(J+I)*XX
105 1110 NEXT I
106 1120 RSI(J)=RSI(J)*COMBIN(J,K)
107 1130 RSC(J)=RSC(J)*COMBIN(J,K)
108 1140 If J=K Then RSI(J)=PRI(J) : RSC(J)=PRC(J)
109 1150 Print " (";J;"/";K;".F) ";
110 1160 Print TAB(29);
111 1162 Print RSI(J);
112 1164 Print TAB(54);
113 1168 Print RSC(J)
114 1172 Next J
115 1174 DRSC(K)=RSC(K)
116 1176 DRSI(K)=RSI(K)
117 1178 FOR J=K-1 TO 0 STEP -1
118 1180 DRSI(J)=RSI(J)+DRSI(J+1)
119 1182 DRSC(J)=RSC(J)+DRSC(J+1)
120 1184 Next J
121 1185 Print
122 1186 Print Chr$(13);" SYSTEM LOGIC";Space$(10);"----- SYSTEM UNAVAILABILITY
-----"
123 1188 Print TAB(29);"INDEPENDENT";TAB(54);"CORRELATED"
124 1189 Print
125 1190 FOR J=0 TO K
126 1191 Print " (>=";J;"/";K;".F) ";
127 1192 Print TAB(29);
128 1194 Print DRSI(J);

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129 1196 Print TAB(54);
130 1198 Print DRSC(J)
131 1210 Next J
132 1212 Return
133 2000 '-----
134 2010 'SUBROUTINE TO COMPUTE STATISTICALLY CORRELATED UNAVAILABILITIES
135 2020 '-----
136 2060 G=Q*(1-V)
137 2070 X=Q
138 2073 PRI(0)=1
139 2076 PRI(1)=Q
140 2080 FOR I=2 TO K
141 2090 PRI(I)=PRI(I-1)*Q
142 2100 NEXT
143 2105 PRC(0)=PRI(0)
144 2110 PRC(1)=PRI(1)
145 2120 FOR I=2 TO K
146 2130 CP=(X^2+S*(X-G)*(1-X))/X
147 2140 PRC(I)=CP*PRC(I-1)
148 2150 X=CP
149 2155 Next
150 2160 Print
151 2161 Print Chr$(13);"  SYSTEM LOGIC";Space$(10);"----- SYSTEM UNAVAILABILITY
-----"
152 2162 Print TAB(29);"INDEPENDENT";TAB(54);"CORRELATED"
153 2164 Print
154 2170 FOR I=0 TO K
155 2180 Print "  (";I;"/";I;".F)";
156 2181 Print TAB(29);
157 2182 Print PRI(I);
158 2184 Print TAB(54);
159 2186 Print PRC(I)
160 2190 Next
161 2200 Return

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