10 REM PRG FOR CALCULATION OF PROBABILITIES WITH RESPECT TO X
15 CLS
20 LOCATE 10,9 : INPUT "INPUT VALUES OF N" : N%
30 DIM P(N%)
35 LOCATE 13,9 : INPUT "INPUT VALUES OF R" : R%
40 FOR X% = 1 TO N% - 1
45 PRINT X%
50 IF X% > R% THEN 1000
60 P(X%) = R% / (N% * (N% - 1))
62 PRINT P(X%)
65 NEXT X%
67 GOTO 1290
1000 REM PRG FOR CALCULATION OF P(X) ABOVE THE VALUE OF R
1040 P1 = R% / (N% * (N% - 1))
1060 D = R% + 1
1070 FOR Y% = D TO X%
1090 F1 = (X% - 1) / (Y% - 1)
1110 FL = 1
1115 DQ = 1
1120 I = 2
1130 Q = (X% - Y% + 1)
1140 A = X% - 1
1160 FOR T = A TO Q STEP -1
1180 F2 = T / (Q% - 1)
1190 I = I + 1
1200 FL = FL * F2
1220 NEXT T
1225 DQ = FL * F1
1230 NQ = NQ + DQ
1240 NEXT Y%
1245 CLS
1246 PRINT : PRINT : PRINT : PRINT
1252 M1 = P1 + (P1 * NQ)
1253 NQ = 0
1254 PRINT : PRINT
1260 PRINT TAB(20) ; "P" ; "( X% ; ") = " ; M1
1270 P(X%) = M1
1280 GOTO 65
1290 W = R% / N%
1300 FOR Z = R% TO (N% - 1)
1310 Z1 = 1 / Z
1320 Z2 = Z1 + Z2
1330 NEXT Z
1340 P(N%) = W * Z2
1400 FOR X% = 1 TO N%
1410 SUM = SUM + P(X%)
1420 SUMX = SUM * X + (P(X%) * X%)
1430 SUMX2 = SUMX * X + (P(X%) * X% * X%)
1440 NEXT X%
1500 REM PROBABILITY OF SELECTING ONE OF THE BEST
1510 P1*2 = (N%) * P(N% - 1)
1520 P1*3 = P1*2 + P(N% - 2)
1530 P1*4 = P1*3 + P(N% - 3)
1540 PB5 = PB4 + P(N % - 4)
1600 REM PRG FOR PRINTING
1601 PRINT "VALUES OF PROBABILITIES WITH RESPECT TO X"
1602 PRINT
1603 PRINT "FOR N = " : N% ; TAB(20) ; "FOR R = " : R%
1604 PRINT : PRINT : PRINT
1610 FOR X% = 1 TO N%
1620 PRINT TAB(10) ; "P" ; "(" ; X% ; "")" ; "=" ; P(X%)
1630 NEXT X%
1635 PRINT : PRINT : PRINT
1640 PRINT "SUM OF PROBABILITIES IS = " ; SUM
1645 PRINT
1650 PRINT "EXCEPTED VALUE OF X IS = " ; SUM X
1655 PRINT
1660 PRINT "EXPECTED VALUE OF X SQRT IS = " ; SUM XX
1665 PRINT
1670 PRINT
1680 PRINT "PROBABILITY OF SELECTING ONE OF BEST 2 IS = " ; PB2
1695 PRINT
1700 PRINT "PROBABILITY OF SELECTING ONE OF THE BEST 3 IS = " ; PB3
1705 PRINT
1710 PRINT "PROBABILITY OF SELECTING ONE OF THE BEST 4 IS = " ; PB4
1715 PRINT
1720 PRINT "PROBABILITY OF SELECTING ONE OF THE BEST 5 IS = " ; PB5
2000 REM PRG FOR CHECKING OF THE DIFFERENCES BETWEEN PROBABILITIES
2004 FOR X% = R% TO N%
2005 K = X% + 1
2006 IF K>N% THEN 2030
2007 IF P(K) - P(X%) > 0 THEN N 2020
2010 PRINT TAB(10) ; "P" ; "(" ; X% ; "")" ; "=" ; P(X%) , P(X% + 1)
2020 NEXT X%
2030 PRINT : PRINT : PRINT
2040 PRINT "" ; "P(X) IS NON DECREASING FUNCTION OF X"
REM PROGRAMME FOR CALCULATION OF PROBABILITIES OF X
INPUT "N,R1,R2", N,R1,R2
DIM P(N)
S1 = 0
FOR I = 0 TO N - R2
P1 = 1
FOR J = -R2 + 1 TO -2
P1 = P1 * (N-I+J)
NEXT J
S1 = S1 + P1
NEXT I
P2 = R1
FOR J = -R2 + 1 TO 0
P2 = P2 / (N+J)
NEXT J
EP = S1 * P2
FOR X = 1 TO R1
P(X) = EP
NEXT X
FOR X = R1 + 1 TO R2 - 1
S1 = 0
FOR Y = R1 + 1 TO X
P1 = 1
FOR J = -Y + 1 TO -2
P1 = P1 * (X+J) / (N+J)
NEXT J
P1 = P1 * (X-1)
S1 = S1 + P1 / (Y-1)
NEXT Y
P(X) = R1 * S1 / (N*(N-1)) + EP
NEXT X
FOR X = R2 TO N
S1 = 0
FOR Y = R1 + 1 TO R2 - 1
P1 = 1
FOR J = -Y + 1 TO -2
P1 = P1 * (X+J) / (N+J)
NEXT J
P1 = P1 * (X-1)
S1 = S1 + P1 / (Y-1)
NEXT Y
P(X) = R1 * S1 / (N*(N-1)) + EP
NEXT X
S = 0
LPRINT "N=", N, " R1=", R1, " R2=", R2
FOR X = 1 TO N
LPRINT "P(" "X") = ", P(X); S = S + P(X); NEXT X
LPRINT "SUM OF PROBABILITIES = "; S
LPRINT "PROBABILITY OF SELECTING OF BEST UNIT=", P(N)
S2 = 0
FOR X = 1 TO N
T = X * P(X)
S2 = S2 + T
NEXT X
LPRINT "EXPECTED VALUE OF X=", S2
END
REM PROGRAMME OF CLACULATION OF PROBABILITIES OF Y
INPUT "N,R1,R2": N,R1,R2
LPRINT "N="; N; "R1="; R1; "R2="; R2
DIM P(N)
FOR Y = R1 + 1 TO R2 - 1
P(Y) = R1 / (Y*(Y-1))
LPRINT "P("; Y; ") ="; P(Y)
NEXT Y
S1=0
FOR I = 0 TO N-R2
P1=1
FOR J = 2 TO R2 - I
P1 = P1*(N-I-J)
NEXT J
S1 = S1 + P1
NEXT I
P2 = 1
FOR J = 1 TO R2 - I - 1
P2 = P2*(N-J)
NEXT J
PR = R1 / P2
P3 = S1 * PR
S = 0
FOR Y = R1 + 1 TO R2 - 1: S = S + P(Y): NEXT Y
LPRINT "S ="; P3
SF = S + P3
LPRINT "SUM OF PROBABILITIES ="; SF
S3 = 0
FOR Y = R1 + 1 TO R2 - 1
T1 = Y * P(Y)
S3 = S3 + T1
NEXT Y
S4 = R2 * P3
S5 = S3 + S4
LPRINT "EXPECTED VALUE OF Y ="; S5
END
Some useful mathematical results and definitions are stated here.

\[ A_{2.1} : n^{(r)} = n(n-1)(n-2) \ldots (n-r+1). \]

\[ A_{2.2} : \sum_{n=a}^{b} n^{(x)} = \frac{1}{x+1} \left[ (b+1)^{(x+1)} - a^{(x+1)} \right] \]

\[ A_{2.3} : \sum_{n=a}^{b} \binom{n}{x} = \binom{b+1}{x+1} - \binom{a}{x+1} \]

\[ A_{2.4} : \binom{x-1}{y-1} = \frac{x-y+1}{y-1} \binom{x-1}{y-2} \]
REFERENCES


2] Bissinger B.H & Siegel(1963): Problem 5086


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