

```
1: program MonteCarlo
2: open(15, file="Monte_Carlo.txt")
3:     idum = -1
4:     N = 10**8
5:     PI = ACOS(-1.0)
6:     EXATO = PI/4.
7:     SUMF = 0.
8:     SUMF2 = 0.
9:     DO 20 IX = 1, N
10:        FX = FUNC(ran3(idum))
11:        SUMF = SUMF + FX
12:        SUMF2 = SUMF2 + FX**2
13:    20 CONTINUE
14:    FAVE = SUMF/N
15:    F2AVE = SUMF2/N
16:    SIGMA = SQRT((F2AVE - FAVE**2)/N)
17:    ERRO = ABS(FAVE - EXATO)
18:    write(15,*) "Integral =", FAVE, "Exato =", EXATO
19:    write(15,*) "Erro estimado:", SIGMA, "Erro obtido:", ERRO
20:    write(15,*) "N =", N
21: end
22:
23: function FUNC(X)
24:     FUNC = 1.d0/(1.d0 + X**2)
25: return
26: end
27:
28: FUNCTION ran3(idum)
29:     INTEGER idum
30:     INTEGER MBIG,MSEED,MZ
31:     REAL ran3,FAC
32:     PARAMETER (MBIG=1000000000,MSEED=161803398,MZ=0,FAC=1./MBIG)
33:     INTEGER i,iff,ii,inext,inextp,k
34:     INTEGER mj,mk,ma(55)
35:     SAVE iff,inext,inextp,ma
36:     DATA iff /0/
37:     if(idum.lt.0.or.iff.eq.0)then
38:         iff=1
39:         mj=abs(MSEED-abs(idum))
40:         mj=mod(mj,MBIG)
41:         ma(55)=mj
42:         mk=1
43:         do 11 i=1,54
44:             ii=mod(21*i,55)
45:             ma(ii)=mk
46:             mk=mj-mk
47:             if(mk.lt.MZ)mk=mk+MBIG
48:             mj=ma(ii)
49: 11     continue
50:     do 13 k=1,4
51:         do 12 i=1,55
52:             ma(i)=ma(i)-ma(1+mod(i+30,55))
53:             if(ma(i).lt.MZ)ma(i)=ma(i)+MBIG
54: 12     continue
55: 13     continue
56:     inext=0
57:     inextp=31
58:     idum=1
59: endif
60:     inext=inext+1
61:     if(inext.eq.56)inext=1
62:     inextp=inextp+1
63:     if(inextp.eq.56)inextp=1
64:     mj=ma(inext)-ma(inextp)
65:     if(mj.lt.MZ)mj=mj+MBIG
66:     ma(inext)=mj
67:     ran3=mj*FAC
68: return
69: END
70:
```