

```
1: program MonteCarlo
2: implicit real*8 (a-h,o-z)
3: open(15, file="Monte_Carlo-DP.txt")
4:     idum = -1
5:     N = 10**7
6:     PI = dACOS(-1.d0)
7:     EXATO = exp(4.d0) - exp(1.d0)
8:     SUMF = 0.d0
9:     SUMF2 = 0.d0
10:    DO 20 IX = 1, N
11:        X = 1.d0 + 3.d0*ran3(idum)
12:        FX = FUNC(X)
13:        SUMF = SUMF + FX
14:        SUMF2 = SUMF2 + FX**2
15:    20 CONTINUE
16:    FAVE = SUMF/N
17:    F2AVE = SUMF2/N
18:    SIGMA = (4.d0 - 1.d0)*dSQRT((F2AVE - FAVE**2)/N)
19:    RESULT = (4.d0 - 1.d0)*FAVE
20:    ERRO = dABS(RESULT - EXATO)
21:    ERRO2 = dABS(RESULT - EXATO)/EXATO * 100
22:    write(15,*) "Integral =", RESULT, "Exato =", EXATO
23:    write(15,*) "Erro estimado:", SIGMA
24:    write(15,*) "Erro obtido:", ERRO
25:    write(15,*) "Erro Percentual:", ERRO2
26:    write(15,*) "N =", N
27: end
28:
29: real*8 function FUNC(X)
30: implicit real*8 (a-h,o-z)
31:     FUNC = dexp(X)
32: return
33: end
34:
35: real*8 FUNCTION ran3(idum)
36: implicit real*8 (a-h,o-z)
37:     INTEGER idum
38:     INTEGER MBIG,MSEED,MZ
39:     PARAMETER (MBIG=1000000000,MSEED=161803398,MZ=0,FAC=1./MBIG)
40:     INTEGER i,iff,ii,inext,inextp,k
41:     INTEGER mj,mk,ma(55)
42:     SAVE iff,inext,inextp,ma
43:     DATA iff /0/
44:     if(idum.lt.0.or.iff.eq.0)then
45:         iff=1
46:         mj=abs(MSEED-abs(idum))
47:         mj=mod(mj,MBIG)
48:         ma(55)=mj
49:         mk=1
50:         do 11 i=1,54
51:             ii=mod(21*i,55)
52:             ma(ii)=mk
53:             mk=mj-mk
54:             if(mk.lt.MZ)mk=mk+MBIG
55:             mj=ma(ii)
56: 11     continue
57:     do 13 k=1,4
58:         do 12 i=1,55
59:             ma(i)=ma(i)-ma(1+mod(i+30,55))
60:             if(ma(i).lt.MZ)ma(i)=ma(i)+MBIG
61: 12     continue
62: 13     continue
63:     inext=0
64:     inextp=31
65:     idum=1
66:     endif
67:     inext=inext+1
68:     if(inext.eq.56)inext=1
69:     inextp=inextp+1
70:     if(inextp.eq.56)inextp=1
71:     mj=ma(inext)-ma(inextp)
72:     if(mj.lt.MZ)mj=mj+MBIG
```

```
73:      ma(inext)=mj
74:      ran3=mj*FAC
75:      return
76:      END
77:
```