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1 !PROGRAM 13
2 ! Name: Debasis Buxy
3 !PRN: 22020004154
4 !to solve a set of linear equations using GAUSS ELIMINATION METHOD
5 module GE
6     real :: A(10,10)
7     integer :: N
8 end module
9
10 subroutine SWAP(I,J)
11     use GE
12     implicit none
13     integer :: I,J,K
14     real :: TEMP
15     do K = 1, N+1
16         TEMP = A(I,K)
17         A(I,K) = A(J,K)
18         A(J,K) = TEMP
19     end do
20 end subroutine SWAP
21
22 program GAUSSELIM
23     use GE
24     implicit none
25     integer :: I, J, K, L
26     real :: X(10), DET, ZERO, SUM, LAMBDA
27
28     open(unit=1, file="gauss1.dat")
29
30     read(1,*) N
31     do I = 1, N
32         read(1,*) (A(I,J),J=1,N+1)
33         write(*,100) (A(I,J),J=1,N+1)
34     end do
35
36     ZERO = 0.0001
37     do I = 1, N-1
38         if (abs(A(I,I))<ZERO) then
39             L = I+1
40             do
41                 if (abs(A(L,I)) > ZERO) then
42                     call SWAP(I,L)
43                     exit
44                 end if
45                 L = L+1
46                 if (L > N) then
47                     write(*,*) "No solution!"
48                     stop
49                 end if
50             end do
51         end if
52         do J = I+1, N
53             LAMBDA = A(J,I)/A(I,I)
54             do K = I, N+1
55                 A(J,K) = A(J,K) - A(I,K)*LAMBDA
56             end do
57         end do
58     end do
59
60     write(*,*) "Triangle matrix: "

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61 do I = 1, N
62     write(*,100) (A(I,J), J=1,N+1)
63 end do
64
65 ZERO = 1E-4
66 DET = 1.0
67 do I = 1, N
68     DET = DET*A(I,I)
69 end do
70
71 write(*,*) "Determinant of the triangle matrix: ", DET
72 if(abs(DET) < ZERO) then
73     write(*,*) "Determinant too small"
74     stop
75 end if
76
77 do I = N, 1, -1
78     SUM = 0.0
79     do J = I+1, N
80         SUM = SUM + A(I,J)*X(J)
81     end do
82     X(I) = (A(I,N+1)-SUM)/A(I,I)
83 end do
84
85 do I=1,N
86     write(*,110) I,X(I)
87 end do
88 100 format(10f7.2)
89 110 format("X",I0," = ",f7.2)
90 end program GAUSSELIM

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