

Assignment-3

Sourav Das (21021085@uopca.unipune.ac.in)

Write a program to generate a magic square of order n (n is odd). Test the program for $n = 3, 5$ and 7 .

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1  ! Sourav Das (1st Sem, MSc); ID: 21021085
2  program magicsquare
3      implicit none
4      integer :: n, start, end, vacant, i, j, k, oldi, oldj, sum
5      integer, dimension(15, 15) :: magic
6      write(*,"(a32)") "Enter the order of Magic Square:"
7      do ! This loop will sanitize user input
8          read(*,*) n
9          if (mod(n, 2) == 0) then
10             write(*,"(a29)") "Enter any value which is odd:"
11          else
12             exit ! exit if user input is valid
13          end if
14      end do
15      write(*,"(a25)") "Enter the starting value:"
16      read(*,*) start
17      write(*, 100) "Order of Magic Square is", n
18      write(*, 200) "The first number to be filled in is", start
19      vacant = start - 1 ! variable to do test whether element in array was changed or not
20      end = start + n*n - 1 ! pre-calculating the ending value of magic square
21      magic = vacant ! All the values of MAGIC array assigned to VACANT
22
23      i = 1 ! starting from 1st row
24      j = (N+1)/2 ! starting from middle-column
25      ! iterating from start value to end value to be filled in magic array
26      do k = start, end
27          magic(i, j) = k
28          oldi = i ! remembering old values
29          oldj = j
30          i = i - 1
31          j = j + 1
32          if (i == 0) i = n ! periodic boundary condition tests
33          if (j > n) j = 1
34          if ( magic(i, j) /= vacant ) then ! checking if element is already filled at this i,j
35              i = oldi + 1 ! then the number to be added below the occupied number
36              j = oldj
37          end if
38      end do
39      do i=1, n ! calculating sum of magic square nos. in 1st row
40          sum = sum + magic(1, i)
41      end do
42      write(*, 300) "The sum of numbers is each row/column/diagonal is:", sum
43      ! writing the magic square
44      write(*, "(a20)") "The magic square is:"
45      do i = 1, n
46          write(*, 400) (magic(i, j), j = 1, n)
47      end do
48      ! Format descriptors
49      100 format(a24, 1x, i2)
50      200 format(a35, 1x, i4)
51      300 format(a50, 1x, i5)
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52      400 format(15i4) ! Max. 15 numbers can be in same row if 15 order matrix
53 end program MAGICSQUARE
54 !! OUTPUT1 (n=3) !!
55 ! Enter the order of Magic Square:
56 ! 2
57 ! Enter any value which is odd:
58 ! 3
59 ! Enter the starting value:
60 ! -3
61 ! Order of Magic Square is 3
62 ! The first number to be filled in is -3
63 ! The sum of numbers is each row/column/diagonal is: 3
64 ! The magic square is:
65 !   4 -3  2
66 !  -1  1  3
67 !   0  5 -2
68 !! OUTPUT2 (n=5) !!
69 ! Enter the order of Magic Square:
70 ! 5
71 ! Enter the starting value:
72 ! 1
73 ! Order of Magic Square is 5
74 ! The first number to be filled in is 1
75 ! The sum of numbers is each row/column/diagonal is: 65
76 ! The magic square is:
77 !  17 24  1  8 15
78 !  23  5  7 14 16
79 !   4  6 13 20 22
80 !  10 12 19 21  3
81 !  11 18 25  2  9
82 !! OUTPUT3 (n=7) !!
83 ! Enter the order of Magic Square:
84 ! 7
85 ! Enter the starting value:
86 ! 5
87 ! Order of Magic Square is 7
88 ! The first number to be filled in is 5
89 ! The sum of numbers is each row/column/diagonal is: 203
90 ! The magic square is:
91 !  34 43 52  5 14 23 32
92 !  42 51 11 13 22 31 33
93 !  50 10 12 21 30 39 41
94 !   9 18 20 29 38 40 49
95 !  17 19 28 37 46 48  8
96 !  25 27 36 45 47  7 16
97 !  26 35 44 53  6 15 24

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