Assignment #3B

Spirals

This assignment will give you practice using a two-dimensional array that you pass to a function. Write a C++ program that arranges consecutive integers in a square spiral pattern which has the same number of rows and columns. At the above CodeCheck URL, complete the program **spirals.cpp**.

A spiral

A size-n spiral is an arrangement of consecutive integers starting at a given value within an n-by-n region of a matrix. Place the starting number in the middle of the region, and arrange the remaining numbers in an outward-growing counter-clockwise spiral. For example, see the size 5 spiral in the expected output below.

The size of a spiral can be 1 through 101 inclusive, and the size will always be odd. The starting value can be 1 through 50. Be sure to check the size and starting value. You will generate and print each matrix in the upper-left corner region of a fixed-size 101-by-101 integer matrix. For this assignment, CodeCheck will verify that you can generate and print the spirals in this table.

Size	Starting value
1	1
5	1
9	11
12 (invalid – not odd)	13
15	17

Your program must pass the matrix as a parameter to at least two functions, **make_spiral** and **print_spiral**.

Expected output

CodeCheck will verify that your program's results match this output exactly.

```
Spiral of size 1 starting at 1

   1

Spiral of size 5 starting at 1

   17  16  15  14  13
   18   5   4   3  12
   19   6   1   2  11
   20   7   8   9  10
   21  22  23  24  25

Spiral of size 9 starting at 11

   75  74  73  72  71  70  69  68  67
   76  47  46  45  44  43  42  41  66
   77  48  27  26  25  24  23  40  65
   78  49  28  15  14  13  22  39  64
   79  50  29  16  11  12  21  38  63
   80  51  30  17  18  19  20  37  62
   81  52  31  32  33  34  35  36  61
   82  53  54  55  56  57  58  59  60
   83  84  85  86  87  88  89  90  91

Spiral of size 12 starting at 13
***** Error: Size 12 must be odd.

Spiral of size 15 starting at 17

 213 212 211 210 209 208 207 206 205 204 203 202 201 200 199
 214 161 160 159 158 157 156 155 154 153 152 151 150 149 198
 215 162 117 116 115 114 113 112 111 110 109 108 107 148 197
 216 163 118  81  80  79  78  77  76  75  74  73 106 147 196
 217 164 119  82  53  52  51  50  49  48  47  72 105 146 195
 218 165 120  83  54  33  32  31  30  29  46  71 104 145 194
 219 166 121  84  55  34  21  20  19  28  45  70 103 144 193
 220 167 122  85  56  35  22  17  18  27  44  69 102 143 192
 221 168 123  86  57  36  23  24  25  26  43  68 101 142 191
 222 169 124  87  58  37  38  39  40  41  42  67 100 141 190
 223 170 125  88  59  60  61  62  63  64  65  66  99 140 189
 224 171 126  89  90  91  92  93  94  95  96  97  98 139 188
 225 172 127 128 129 130 131 132 133 134 135 136 137 138 187
 226 173 174 175 176 177 178 179 180 181 182 183 184 185 186
 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241
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