Math 110
Mathematical Systems Circle Project

An example for (16,7) is listed below:

Step 1 – Create a table for multiplication under mod 16

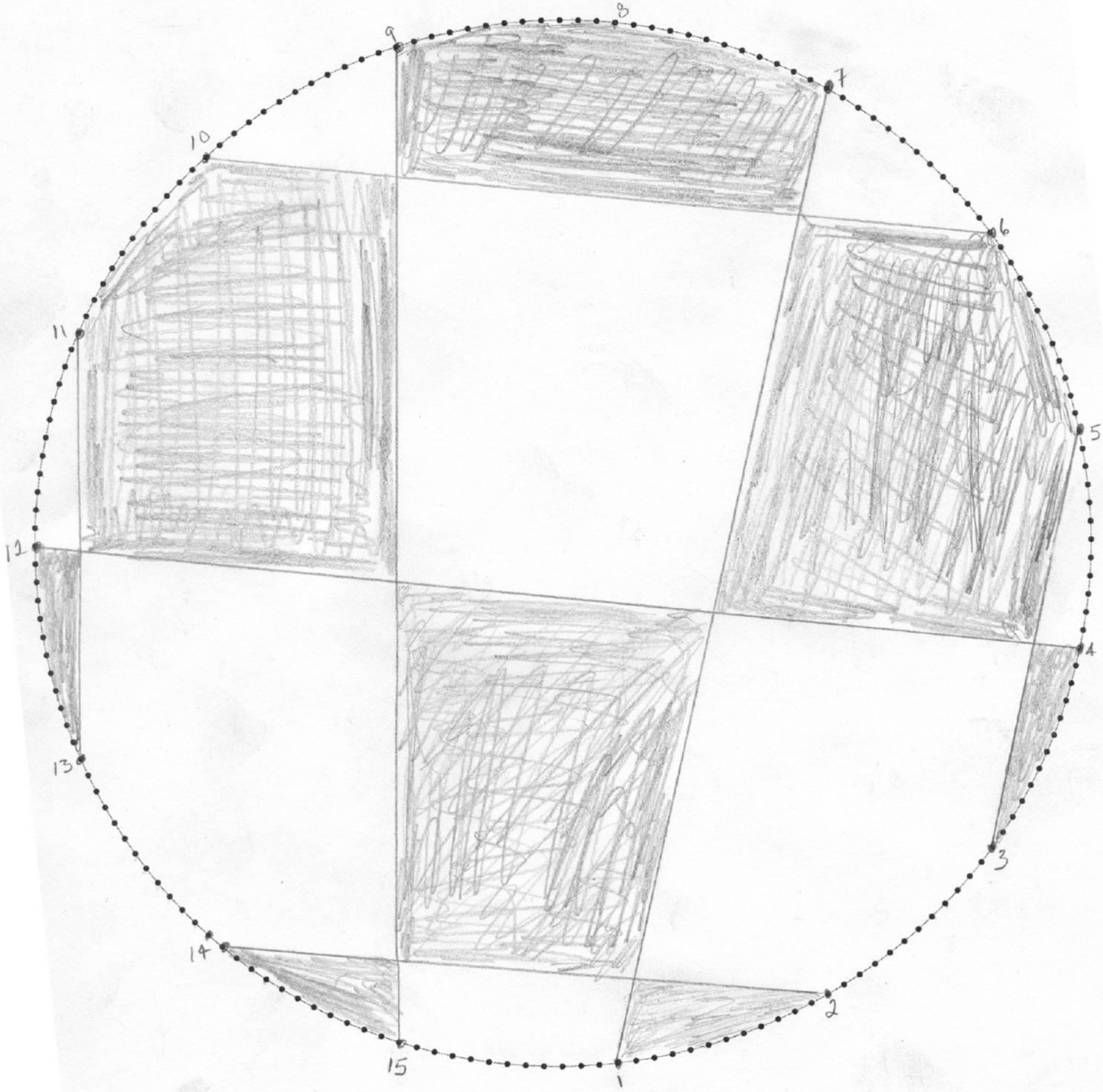
x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	2	4	6	8	10	12	14	0	2	4	6	8	10	12	14
3	3	6	9	12	15	2	5	8	11	14	1	4	7	10	13
4	4	8	12	0	4	8	12	0	4	8	12	0	4	8	12
5	5	10	15	4	9	14	3	8	13	2	7	12	1	6	11
6	6	12	2	8	14	4	10	0	6	12	2	8	14	4	10
→ 7	7	14	5	12	3	10	1	8	15	6	13	4	11	2	9
8	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8
9	9	2	11	4	13	6	15	8	1	10	3	12	5	14	7
10	10	4	14	8	2	12	6	0	10	4	14	8	2	12	6
11	11	6	1	12	7	2	13	8	3	14	9	4	15	10	5
12	12	8	4	0	12	8	4	0	12	8	4	0	12	8	4
13	13	10	7	4	1	14	11	8	5	2	15	12	9	6	3
14	14	12	10	8	6	4	2	0	14	12	10	8	6	4	2
15	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Step 2 – Use the circle provided by your instructor, which has a point every 2^o (180 points). Take $180 \div (n - 1)$, in this case $n = 16$ so $180 \div (16 - 1) = 12$ increments. Every 12 increments a mark was made, those marks were numbered 1 through 15 on the next page.

Step 3 – Use the multiplier, 7 in this example, as the row to be used to identify pairs that form chords. The column number and the value in the product row highlighted form the ordered pairs. The first line segment will connect 1 to 7, then (2, 14), (3, 5), … See the next page for the line segments drawn.

Step 4 – Shade the regions. See the next page for gray and white example.
Colored shading required if you are working with less than mod 16, colored markers and rulers available in MacLean 276.

Circular Project Example



(16, 7)