National Yang Ming Chiao Tung University
Institute of Electronics & Institute of Pioneer Semiconductor Innovation
Advanced Algorithms, Spring 2025

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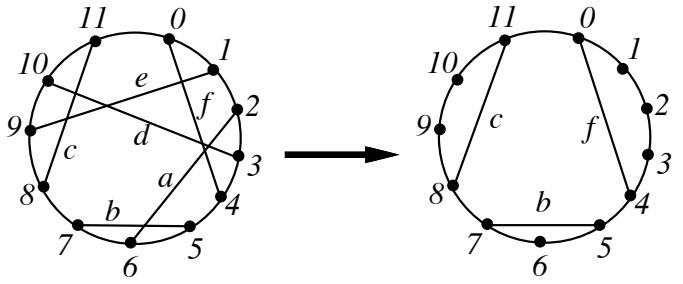
Instructor: Mark P.-H. Lin

Programming Assignment #1

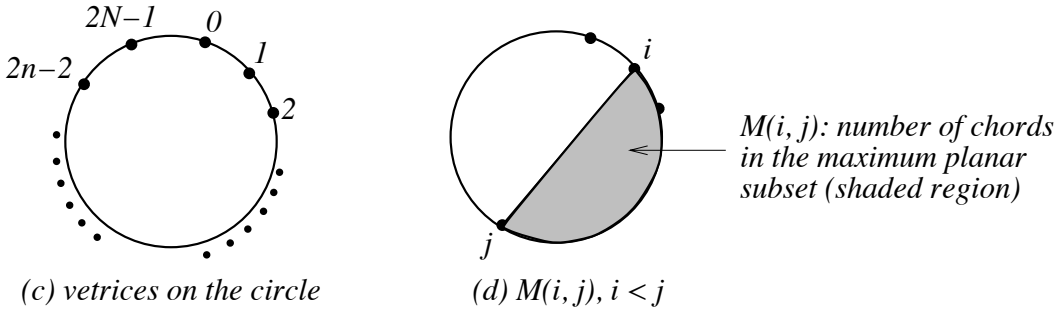
1 Problem Description

Given is a set C of n chords of a circle (see Figure (a)). We assume that no two chords of C share an endpoint. Number the endpoints of these chords from 0 to $2n-1$, clockwise around the circle (see Figure (b)). Let $M(i,j)$, $i \leq j$, denote the number of chords in the maximum planar subset (i.e., no two chords overlap each other in the subset) in the region formed by the chord $\overline{ij}$ and the arc between the endpoints i and j (see Figure (d)). As the example shown in Figure(a), $M(2,7) = 1$, $M(3,3) = 0$, and $M(0,11) = 3$. You are asked to write a program that computes the number of chords in the maximum planar subset in a circle of n chords, i.e., compute $M(0, 2n-1)$.



(a) A set of chords.

(b) Maximum planar subset of chords.



(c) vetrices on the circle

(d) M(i, j), i < j

2 Input

The input consists of an integer $2n$, $1 \leq n \leq 10000$, denoting the number of vertices on a circle, followed by several lines, each containing two integers a and b ($0 \leq a, b \leq 2n-1$), denoting two endpoints of a chord. A single "0" (zero) in the input line signifies the end of input.

3 Output

The number of chords in the maximum planar subset in a circle of n chords.

Sample Input	Output for the Sample Input
12 0 4 1 9 2 6 3 10 5 7 8 11 0	3