# Algorithm

In the original sweep algorithm, we monitor the events, “Insert”, “Remove”, and “Swap” to maintain the order of line segments. The first challenge to apply this algorithm to circle-circle intersections is how to define those events for circles. For this purpose, I split each circle into four quarters as shown below.

As a result, we can define the “Insert” and “Remove” events similar to the line segments, but there is still some tricky situation that we have to take care of. In the case of the figure below, the X coordinate order of two edges are

Here, even though there are four arcs that belong to the same circle, we do not want to compute the intersections of the circle with the other for four times. Instead, I compute the intersections of each pair of circles at most once, and store them in hash table so that the computed intersections can be referred to in the constant time. For the computation of the circle-circle intersections, we can use the following equation:

where d = ???.

The next challenge is that two circles can intersect at two points. To deal with this, I first compute two intersections as described above, and check whether those are within the edges. If only one intersection is on the edges, “Swap” event is added similar to the line segment version of algorithm. If both intersections are on the edges, the intersection with higher Y coordinate is added as “Swap” event in the same way, but for the other intersection, the “Swap” event with swapped order of edges is added. (Figure ?).

# Implementation