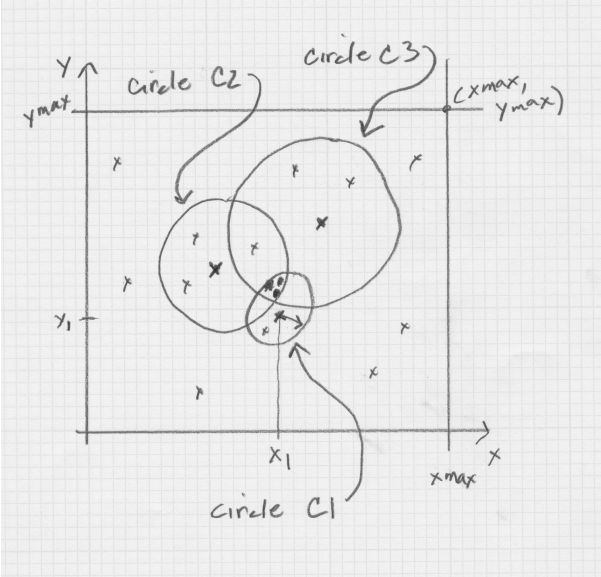
Monte Carlo method: find the intersection of three circles

Problem setup:

Circle	(x, y)	radius
C1	(x1, y1)	r1
C2	(x2, y2)	r2
C3	(x3, y3)	r3

See the figure.



The points marked 'x' do not lie within all three circles. The points marked '•' do lie within all three circles (I have drawn only three •s)

The area in the intersection of the three circles is measured by the
(points within C1 && C2 && C3) / # points in bounding box) * area of bounding box

Pseudocode:

```
// To simplify, we'll put the bounding box at (0, 0) to (xmax, ymax)
// Other locations for the bounding box are straight-forward extension

bbCount = 0;
bbArea = xmax * ymax;

areaCount = 0;

repeat many times {
      // generate (x, y) within bounding box
      generate random x between 0 and xmax;
      generate random y between 0 and ymax;

      bbCount++;              // increment area of bb counter

      if (  withinC(x, y, x1, y1, r1) &&
            withinC(x, y, x2, y2, r2) &&
            withinC(x, y, x3, y3, r3) )
                  areaCount++;      // generated point is under curve
      }

return  (areaCount / bbCount) * bbArea;

/*****************************************************************/

boolean withinC (x, y, xC, yC, rC) {

      if ((x, y) is within the circle radius rC located at (xC, yC))
            return (true);
            else return (false);
      }
```