# CS13002 Programming and Data Structures, Spring 2005, Section 4/D

**Laboratory Test I** **Total points: 20** **February 8, 2005**

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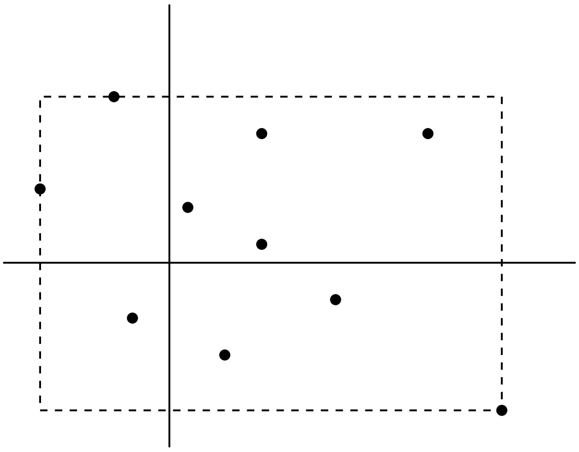
### For students with odd PC numbers

Write a program that does the following:

- Read or randomly select 20 points given by $X$ and $Y$ coordinates. Store the coordinates in two arrays.
- Find the minimum and the maximum of the $X$-coordinates of the points.
- Find the minimum and the maximum of the $Y$-coordinates of the points.
- Determine the smallest rectangle with sides parallel to $X$ and $Y$ axes, that encloses all the given points. The coordinates of the corners of the rectangle and its area are to be reported.

An example on 10 points is given below:



### Note

You may restrict the coordinates of the points to integer values between $-10$ and $+10$. In order to generate a random integer between $-10$ and $+10$, use the following call:

```
var = rand() % 21 - 10;
```

If you plan to generate different random points in different runs, use the call

```
srand((unsigned int)time(NULL));
```

at the beginning of your `main()` function (after variable declaration).

You may completely avoid using arrays and maintain the four max/min values on the fly, i.e., adjust these values as soon as a new point is generated.

### Output

Report the coordinates of the 20 points, the four max/min values, the coordinates of the four corners of the smallest enclosing rectangle and the area of this rectangle.

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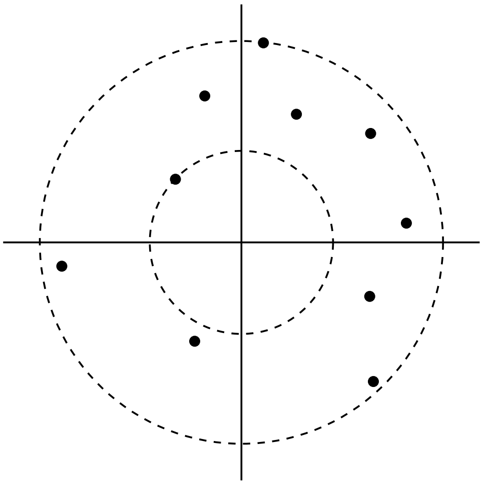
### For students with even PC numbers

Write a program that does the following:

- Read or randomly select 20 points given by $X$ and $Y$ coordinates. Store the coordinates in two arrays.
- Compute the distance of each point from the origin.
- Find the minimum and maximum of these distances.
- Determine the smallest ring with center at the origin, that encloses all the given points. The inner and outer radii of the ring and its area are to be reported.

An example on 10 points is given below:



### Note

You may restrict the coordinates of the points to integer values between $-10$ and $+10$. In order to generate a random integer between $-10$ and $+10$, use the following call:

```
var = rand() % 21 - 10;
```

If you plan to generate different random points in different runs, use the call

```
srand((unsigned int)time(NULL));
```

at the beginning of your `main()` function (after variable declaration).

You may completely avoid using arrays and maintain the max and min distances on the fly, i.e., adjust these values as soon as a new point is generated.

### Output

Report the coordinates of the 20 points, their distances from the origin, the max and min values of these distances, the inner and outer radii of the smallest enclosing ring and the area of this ring.