

ESS201: Programming II - Lab
Assignment on C programming
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This lab assignment is to warm up on coding exercises. In this lab assignment, we are going to use `struct` to get an understanding of composition and to an extent, inheritance, in the object-oriented programming paradigm.

We are constructing a **drawing canvas** here, where we can draw four different geometric primitives, a point, a line segment, a triangle, and a circle. We will assume that the coordinate system can take x- and y- values which are real values. The task is to input two primitives at a time and output if they intersect or not. The output should be a string, either “The primitives intersect” or “The primitives do not intersect”.

The code-string for the four primitives are:

1. “C x y r”, for a circle of radius r, and origin (x,y).
2. “T x1 y1 x2 y2 x3 y3”, for a triangle with vertices (x1,y1), (x2,y2), and (x3,y3).
3. “L x1 y1 x2 y2”, for a line-segment with vertices (x1,y1), and (x2,y2).
4. “P x y”, for a point (x,y).

It is sufficient to have the following test functions for checking for intersections:

1. Is a given point inside a circle?
2. Does a given line-segment intersect a circle?
3. Do two given line-segments intersect?

Few points to note:

1. Intersection with a triangle can be checked as an OR operation of the intersection with each of its 3 edges.
2. The circle-line intersection can be checked using the logic provided in <http://mathworld.wolfram.com/Circle-LineIntersection.html>
3. A primitive interior to another primitive does not imply intersection. Hence, by that condition, a point intersects with any other primitive only if it lies on the boundary of the latter.
4. It is mandatory to use `struct` in this assignment.

Input-output samples:

```
$mycanvas C 0 1 3 P 0 -2
$The primitives intersect.
```

```
$mycanvas T 0 0 0 1.5 1.5 0 L 2.5 1.5 1.5 2.5
$ The primitives do not intersect.
```