

LAB 3: Point-in-circle test

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To compute if a point is inside the circle, I will use the concept explained in class about projecting the points on a paraboloid. The plane defined by the projected circle points can be used to know if the point is inside or not the circle. An orientation test will be used, computing the determinant of these projected points to know in which side of the plane the projected point falls.

We need to take into account the clock order of the circle points, because they change how the plane orientation is defined.

Code overview:

```
//Determinant of the points p,a,b,c projected on the paraboloid z=x^2 + y^2
function det_projected_points(p, a, b, c) {
    var M=[ [b.x - a.x, b.y - a.y, (b.x - a.x)*(b.x + a.x) + (b.y - a.y)*(b.y + a.y)],
            [c.x - a.x, c.y - a.y, (c.x - a.x)*(c.x + a.x) + (c.y - a.y)*(c.y + a.y)],
            [p.x - a.x, p.y - a.y, (p.x - a.x)*(p.x + a.x) + (p.y - a.y)*(p.y + a.y)] ];
    return det(M);
}

var a = circle_points[0];
var b = circle_points[1];
var c = circle_points[2];

var clockOrder = Math.sign(det_points(a,b,c));
var planeSide = Math.sign(det_projected_points(p, a, b, c));

if (planeSide == 0)                // ON CIRCLE
else if (planeSide != clockOrder) // INSIDE CIRCLE
else                               // OUTSIDE CIRCLE
```