POSITION OF A POINT P(x_1, y_1) w.r.t. CIRCLE

Circle : $S = x^2 + y^2 + 2gx + 2fy + C = 0$

$r = \sqrt{g^2+f^2-C}$

$P \equiv (x_1, y_1)$, $O \equiv (-g, -f)$

$S_1 = x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + C$

Method I

$S_1 > 0$	$S_1 = 0$	$S_1 < 0$
Point lie outside Circle	Point lie on the Circle	Point lie inside Circle
		

Method II

Step I: Find distance OP using distance formula

Step II: Find radius using $r = \sqrt{g^2+f^2-C}$

OP > r	OP = r	OP < r