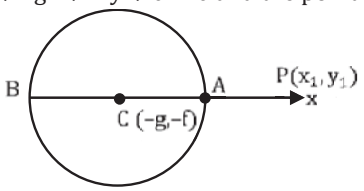
Circle and Point

Consider the equation of the circle as:

$x^2 + y^2 + 2gx + 2fy + c = 0$ and the point $P(x_1, y_1)$



Here r = radius $= \sqrt{g^2 + f^2 - c}$ and P is a variable point and also consider that

$$S_1 = x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c.$$

1. If point P lies outside the circle, then $PC > r \Rightarrow PC^2 > r^2 \Rightarrow S_1 > 0$

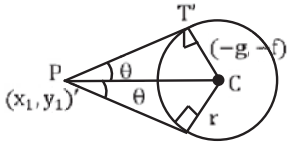
2. If point P lies on the circle, then $PC = r \Rightarrow S_1 = 0$

3. If point P lies inside the circle, then $PC < r \Rightarrow S_1 < 0$

4. The minimum distance of point P from the circle is given by PA = PC - r, but if P is inside The circle, then $PA = r - PC$. Hence the minimum distance $= |PC - r|$.

5. The maximum distance $= PC + r$

6.



(a) The length of the tangent from point P is $PT = \sqrt{PC^2 - r^2} = \sqrt{S_1}$

(b) The angle between the tangents is 2θ where $\tan\theta = \frac{r}{\sqrt{S_1}}$