$$(x-x_c)^2+(y-y_c)^2=r^2 \quad \text{— [Equation of circle]}$$

$$\Rightarrow x^2-2x_cx+x_c^2+y^2-2y_cy+y_c^2=r^2$$

$$\Rightarrow x^2+ax+x_c^2+y^2+by+y_c^2=r^2 \quad [a=-2x_c,\ b=-2y_c]$$

$$\Rightarrow ax+by+(x_c^2+y_c^2-r^2)=-(x^2+y^2)$$

$$\Rightarrow ax+by+c=-(x^2+y^2)$$

$$\left\{\begin{array}{l} a=-2x_c \\ b=-2y_c \\ c=x_c^2+y_c^2-r^2 \end{array}\right\}$$

$$ax_1+by_1+c=-(x_1^2+y_1^2)$$
$$ax_2+by_2+c=-(x_2^2+y_2^2)$$
$$ax_3+by_3+c=-(x_3^2+y_3^2)$$
$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \\ \vdots & \vdots & \vdots \end{bmatrix}_{m\times 3} \begin{bmatrix} a \\ b \\ c \end{bmatrix}_{3\times 1} = \begin{bmatrix} -(x_1^2+y_1^2) \\ -(x_2^2+y_2^2) \\ \vdots \\ \end{bmatrix}_{n\times 1}$$

$$\begin{bmatrix} a \\ b \\ c \end{bmatrix} = \underline{\text{pinv}(m)*n}$$

$$x_c=-a/2, \quad y_c=-b/2,$$

$$r=\sqrt{(x_c^2+y_c^2-c)}$$