Math 3280 Worksheet 18: Curve-fitting with matrices

Group members (2 to 4): _____

(1) Using the equation
$$Ax + By + C = x^2 + y^2,$$
find a circle passing through the points $(1, 7)$, $(-1, 3)$, and $(0, 0)$. After finding A, B, and C, put the circle's equation in the standard form
$$(x - c_x)^2 + (y - c_y)^2 = r^2.$$
(complete the squares.)

(2) Find the ellipse of minimal area which is of the form

$$(x, y)M\begin{pmatrix} x \\ y \end{pmatrix} = 1$$

where $M = \begin{pmatrix} A & C \\ C & B \end{pmatrix}$, and which passes through the points $(1, 1)$ and $(-1, 2)$.

The area of such an ellipse is $\dfrac{\pi}{\sqrt{\det(M)}}$.