Assignment 3
Linear Algebra

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I. Problem

Find the equation of a circle with centre $\begin{pmatrix}2\\2\end{pmatrix}$ and passes through the point $\begin{pmatrix}4\\5\end{pmatrix}$.

II. Solution

The equation of circle is given as

$$(x-h)^2+(y-k)^2=r^2 \tag{1}$$

The centre is at $\begin{pmatrix}2\\2\end{pmatrix}$, so h=2 and k=2. The equation now becomes

$$(x-2)^2+(y-2)^2=r^2 \tag{2}$$

Since the circle passes through the point $\begin{pmatrix}4\\5\end{pmatrix}$, this point is solution to the equation of circle. Substituting the values we get the radius as below:

$$r^2=(4-2)^2+(5-2)^2 \tag{3}$$
$$\implies r=\sqrt{13} \tag{4}$$

Substituting the value of r in equation (2) and simplifying it we get the equation of circle.

$$(x-2)^2+(y-2)^2=\sqrt{13}^2 \tag{5}$$
$$\implies x^2+4-4x+y^2+4-4y=13 \tag{6}$$
$$\implies x^2+y^2-4(x+y)=5 \tag{7}$$

The following python code generates the equation of circle
Link : https://github.com/Swati-Mohanty/EE5600/blob/master/Assignment