

ASSIGNMENT #1

(Dr. Faisal Shah Khan)

ID #BC210402929

(Muhammad Umair)

Question

Consider the equation of a circle $x^2 - 2x + y^2 - 4y - 4 = 0$ and if the line $2x - y + a = 0$ is its diameter. Then find the value of a .

Solution

Given equation,

$$x^2 - 2x + y^2 - 4y - 4 = 0$$

Moving all the constants to the right hand side of the equation,

$$x^2 - 2x + y^2 - 4y = 4$$

Now expanding the equation using completing square method:

Taking the coefficient of b and dividing it by 2 and by taking the square of answer and added to both sides of the equation, now we get this

$$(x^2 - 2x + (1)^2) + (y^2 - 4y + (2)^2) = 4 + (1)^2 + (2)^2$$

Now using $(a - b)^2$ square formula, we structured the equation,

$$(x - 1)^2 + (y - 2)^2 = 9$$

Structuring the equation using **standard form of the equation of a circle.**

$$(x - 1)^2 + (y - 2)^2 = 3^2$$

Here,

$$x - 1 = 0 \quad x = 1$$

$$y - 2 = 0 \quad y = 2$$

$$r = 3$$

Equation of a circle with center $(1, 2)$ and radius 3, now using given diameter $2x - y + a = 0$

$$2(1) - (2) + a = 0$$

By cancelling the both positive and negative 2, we finally get the value of a

$$2 - 2 + a = 0$$

$$a = 0$$

Answer

$$a = 0$$