

Answer on Question #82197 – Math – Calculus

Question

In the system shown below, what are the coordinates of the solution that lies in quadrant II?

Write your answer in the form (a, b) without using spaces.

$$x^2 + y^2 = 5$$

$$y = \frac{1}{4}x^2 \text{ -----}$$

Solution

We are given equations

$$x^2 + y^2 = 5 \quad (1)$$

and

$$y = \frac{1}{4}x^2 \quad (2)$$

We can find intersection points by solving system of equations (1) and (2). From the equation (2) we find

$$x^2 = 4y \quad (3)$$

Substitution (3) into equation (1) gives

$$4y + y^2 = 5$$

This is a quadratic equation. Rewrite it in the form

$$y^2 + 4y - 5 = 0$$

And solve it for y

$$D = 4^2 - 4(-5) = 16 + 20 = 36$$

$$y_1 = \frac{-4 + \sqrt{36}}{2} = \frac{-4 + 6}{2} = \frac{2}{2} = 1$$

$$y_2 = \frac{-4 - \sqrt{36}}{2} = \frac{-4 - 6}{2} = \frac{-10}{2} = -5$$

By substitution y_1 and y_2 into equation (3) we find x

$$x^2 = 4 \cdot 1 \Rightarrow x_1 = -2 \text{ and } x_2 = 2$$

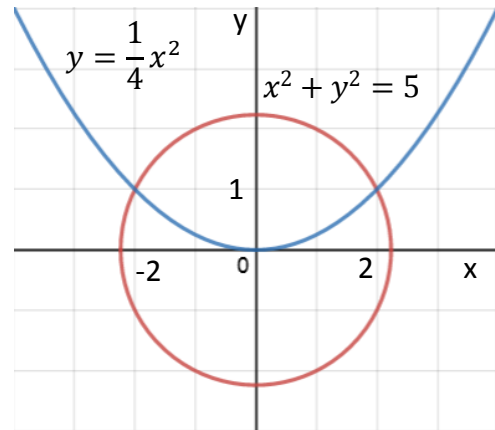
$$x^2 = 4 \cdot (-5) \Rightarrow x^2 = -20 \text{ this equation doesn't have any solution}$$

So, we have two points of intersection

$(-2,1)$ and $(2,1)$

Point $(-2,1)$ is in quadrant II

Point $(2,1)$ is in quadrant I



Answer: coordinates of intersection point in quadrant II is $(-2,1)$.