

Answer on Question #57345 – Math – Analytic Geometry

Question

1. What is the maximum number of intersection points a parabola and a circle could have?

- A: 2
- B: 3
- C: 4
- D: 1

Solution

The canonical equation of the parabola is $y^2 = 2px$, the canonical equation of the circle is $x^2 + y^2 = a^2$.

The intersection points are determined by the solutions of the following system

$$\begin{cases} y^2 = 2px \\ x^2 + y^2 = a^2 \end{cases} \Rightarrow x = y^2 / 2p$$

$$\frac{y^4}{4p^4} + y^2 = a^2 \Rightarrow$$

$y^4 + 4p^4y^2 = 4p^4a^2$ is equation of the fourth degree, hence the maximum number of intersection points is 4.

Answer: C: 4.

Question

2. What is the maximum number of possible solutions for the system shown below?

$$\begin{cases} x^2 - 4y^2 = 64 \\ x^2 + y^2 = 36 \end{cases}$$

- A: 4
- B: 2
- C: 3
- D: 1

Solution

$$\begin{cases} x^2 - 4y^2 = 64 \\ x^2 + y^2 = 36 \end{cases}$$

$$\Rightarrow 5y^2 = -28 \Rightarrow \emptyset.$$

There are no points of intersection, but this type of equations, where we have intersection between hyperbola and circle, we can obtain at most 4 points of intersection.

Answer: A: 4.