Answer on Question #41426 – Math – Analytic Geometry

Question. Express by an algebraic equation the statement that the point $P(x, y)$ is at a distance 3 from $(-7, -3)$

Solution. A distance between two points $A_0(x_0, y_0)$ and $B(x_1, y_1)$ can be computed by the formula:

$$d(A, B) = \sqrt{(x_0 - x_1)^2 + (y_0 - y_1)^2}.$$

If $A = P(x, y)$ and $B = (-7, -3)$, then

$$d(P, B) = \sqrt{(x + 7)^2 + (y + 3)^2}.$$

Therefore, the statement that

the point $P(x, y)$ is at a distance 3 from $(-7, -3)$

can be expressed by the following algebraic equation:

$$\sqrt{(x + 7)^2 + (y + 3)^2} = 3.$$

Since the expression under the square root is always non-negative, the latter equation is equivalent to the following one:

$$(x + 7)^2 + (y + 3)^2 = 3^2,$$

that is

$$(x + 7)^2 + (y + 3)^2 = 9.$$

Answer. $(x + 7)^2 + (y + 3)^2 = 9$.