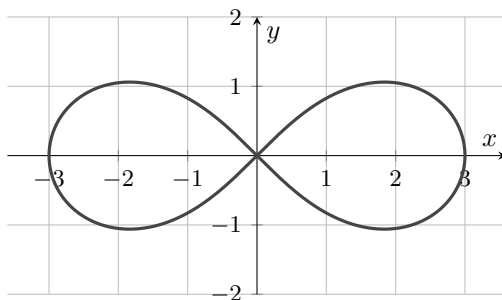
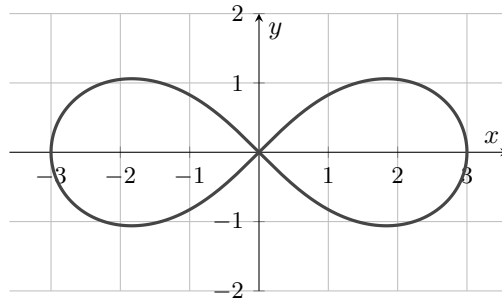


Question 3**Problem**

Convert $r^2 = 9 \cos 2\theta$ to Cartesian form without using inverse trigonometric functions.



Question 3 – Solution

**Solution**

1. Use the polar–Cartesian relationships

$$x = r \cos \theta, \quad y = r \sin \theta, \quad r^2 = x^2 + y^2.$$

Equivalent polar coordinates satisfy

$$(r, \theta) = (r, \theta + 2k\pi) = (-r, \theta + (2k + 1)\pi).$$

2. Apply the identity that matches the requested conversion, symmetry test, or intersection, and then check the resulting point or curve in the original polar equation.
3. Since $\cos 2\theta = (x^2 - y^2)/r^2$, $r^4 = 9(x^2 - y^2)$.
4. Thus $\boxed{(x^2 + y^2)^2 = 9(x^2 - y^2)}$.