

# Unsolved problems

Guo Haoyang

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## Contents

<a href="#">1</a>	<a href="#">Galois Theory</a>	<a href="#">2</a>
<a href="#">2</a>	<a href="#">Algebraic Geometry</a>	<a href="#">2</a>
<a href="#">3</a>	<a href="#">Algebraic Topology</a>	<a href="#">2</a>

## 1 Galois Theory

## 2 Algebraic Number Theory

## 3 Algebraic Geometry

### Question 3.1: Jacobian conjecture for $\mathbb{A}^2$ and $\mathbb{A}^n$

Let  $k$  be a field with  $\text{char } k = 0$ . Given  $f, g \in k[x, y]$ ,  $x' = f(x, y)$   $y' = g(x, y)$  is an automorphism in  $\mathbb{A}^2$   
 $\Leftrightarrow$  the Jacobian determinant  $\frac{\partial(f, g)}{\partial(x, y)}$  is a non-zero constant.  
A general version is for  $\mathbb{A}^n$ .

**Updates:** This conjecture is proved for  $\deg f$  and  $\deg g$  are not too large ( $\approx 100$ ).

## 4 Algebraic Topology