

Problemath series 3

23 November 2009

Problemath 7

(This year is the 175th anniversary of Université Libre de Bruxelles, so...)

Which of the two numbers below is the largest?

$(18342009!)^2$ or $(18342009)^{18342009}$?

Problemath 8

Let P_1 and P_2 be parabolas in the \mathbb{R}^2 plane. Their respective equations are: $y = x^2$ and $y = -x^2$. If parabola P_1 rolls without sliding on parabola P_2 which remains fixed, express the trajectory of the focus of parabola P_1 .

Problemath 9

Alice: "Today is my birthday and my age is a root of a polynomial in x , with integer coefficients."

Bob: " If I replace x by 7, I get 77".

Alice: " Do I look like I am 7 years old?!"

Bob: "Oops! You're right. I will replace x by a larger whole number N Now, I get 85, not zero."

Alice: "Come on! Can't you see that my age is more than N ?"

How old is Alice?

Problemath 10

A convex regular "2010-gon" is inscribed in a circle of radius r . Prove that the product of the distances of one vertex to all the 2009 other vertices is equal to:

$$2010r^{2009}$$

The solutions should be sent to: jdoyen@ulb.ac.be by Friday 18 December 2009, 14:00.