## Monday, September 15

1. In Arithmeticorum libri duo (1575), Maurolico shows that, for each positive integer n,

 $1 + 3 + 5 + \dots + (2n - 1) = n^2.$ 

Prove his statement by induction.

2. Recall that the Fibonacci numbers  $F_n$  are defined by

$$F_0 = 0$$
  
 $F_1 = 1$   
 $F_n = F_{n-2} + F_{n-1}$  if  $n \ge 2$ .

Let

$$S_n = \sum_{j=1}^n F_j$$
  
=  $F_1 + F_2 + \dots + F_n$ 

Prove that, for each *n*,

 $S_n=F_{n+2}-1.$ 

3. Prove by induction that, for each natural number *n*,

 $n < 2^{n}$ .

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