Real Quiz # 7 for Dr. Z.'s MathHistory

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Email DrZlinear@gmail.com as soon as I tell you (around 3:15pm)

Subject: q7

with an attachment called

q7FirstLast.pdf (e.g. q7PaulErdos.pdf)

1. (2 points) Who "proved" that

$$1 - 1 + 1 - 1 + 1 - 1 + 1 - 1 + \ldots$$

equals $\frac{1}{2}$? Briefly describe his "proof".

Guido Grandi considered the case of a father who gives a gem to his two sons

2. (2 points) Who translated Newton's *Principia* into French, and who wrote *Lettres sur les Anglais?*

Chatlet translated Newtons Principia into french
Voltaire wrote Lettres sur les Anglais.

3. (1 point) Who proved that every integer is a sum of four or less squares?

Lagrange

4. (2 point) Express the permutation

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 9 & 8 & 7 & 5 & 6 & 4 & 3 & 2 & 1 \end{pmatrix} ,$$

as a product of disjoint cycles. What is the smallest i such that π^i is the identity permutation?

(19)(28)(37)(456)

lcm (2,2,2,3) = 6

$\boxed{i = 6}$

5. (3 points) Prove that in the nine puzzle, if you start with

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & \end{pmatrix} \quad it \quad is \quad impossible \quad to \quad get \quad to \quad \begin{pmatrix} 3 & 2 & 1 \\ 4 & 5 & 6 \\ 7 & 8 & \end{pmatrix}$$

by sliding.

Note: You can use (without proving) the lemma that whenever two elements of a permutation trade places, and all the other elements stay where they are, the number of inversions changes by an odd integer (i.e. is $\pm 1, \pm 3, \pm 5, \pm 7, \ldots$ of what it used to be.

To make a "legal move" through sliding, any legal move preserves the parity of S. It is impossible to go from a parity that is even $(0 + 3 + 3)$ to a parity that is odd in S $(1 + 3 + 3)$ through sliding either horizontally or vertically.