Homework for Dr. Z.'s MathHistory for Lecture 3 (Due Feb. 9, 2017)

Last Update: Feb. 5, 2017

0. Read and understand Chapter II, sections 6-7 (pp. 31-36) summarize its content in your own words and your own handwriting, and write it in your HISTORY notebook, [You should have at least the equivalent of two typed pages, but you are welcome to write more]

The other problems should be in your MATH notebook.

1. Prove

$$\sum_{k=1}^{n} 2k - 1 \;=\; n^2$$

(a) The 'usual' (boring!) way, using mathematical induction

(b) The *fun way*, using Geometry (the way the Greeks did it) [I demonstrated it in class, on the tiles on the floor, by breaking the four by four square into L-shaped slices]

(c) Dr. Z.'s way (the most fun!)

2. Prove

$$\sum_{k=1}^{n} k \;=\; \frac{n(n+1)}{2}$$

(a) The 'usual' (boring!) way, using mathematical induction

(b) The *fun way*, using seven-year-old Gauss's 'method of bridges'.

[Look it up in `http://mathcentral.uregina.ca/qq/database/qq.02.06/jo1.html`]

(c) Dr. Z.'s way (the most fun!)

3. Derive an explicit formula for

$$\sum_{k=1}^{n} k^2$$

using Dr. Z.'s method. Then prove it (a) the 'usual' (boring!) way (b) Dr. Z.'s way

4. Prove

$$\sum_{k=1}^{n} k^3 = \left(\frac{n(n+1)}{2}\right)^2$$

(a) the 'usual' (boring!) way. (b) Dr. Z.'s way

5. Look at the following url directory

`http://www.math.rutgers.edu/~zeilberg/math436/magic/`

and locate the file with your name (for people whose first name is longer than six letters, please send me a shorter name), and pick the magic square that you like best with the following conditions

• Each word (besides your name) is a real world that is not a proper name and not an abbreviation.

• You already know, or looked up, the meaning of each word word

Make it into a nice cardboard, decorate it, and carry it in your pocket at all times, for good luck. You must show me this card during the homework inspection on Feb. 9, 2017.

Note: For some people, the computer came with nothing. For example, Tyler did not work, but Tyler's last name, Volpe, did. For those who could not find their names, please email me another favorite name.