Homework for Dr. Z.'s MathHistory for Lecture 18

0. Read and understand Chapter VIII, sections 4-6 (pp. 209-219) 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 either hand-written or typed and sent as .pdf file or .txt file (PLEASE no other formats) to DrZlinear@gmail.com by 8:00pm Sunday, Nov. 21, 2021 ,

Subject: hw18

with an attachment: hw18FirstLast.pdf (or hw18FirstLast.txt)

Also in the BODY of the homework, have your name and indicate whether it is OK to post the homework in my web-site.

1. Write down the names of the five Platonic solids, for each of them write down

their number of vertices, their number of edges, and their number of faces

2. Write down, understand, and be able to write-down in a test, the proof of the fact that for any planar map with V vertices, E edges, and F regions, (not counting the " infinite ocean"), one always has $V - E + F = 1$.

3. A perfect, platonic solid has all its vertices with the same number of edges adjacent to it, and every face with the same number of edges surrounding it.

Let, as usual V be the number of vertices, E be the number of edges, F the number of faces

If you call the number of edges meeting every vertex a, and the number of edges around every face b,

(i) prove that $V = \frac{2E}{a}, F = \frac{2E}{b}$

(ii) By using $V - E + F = 2$, and algebra, express E in terms of a and b.

(iii) Find all the $3 \leq a, b \leq 5$ that makes E a positive integer.

For each of these, state the corresponding Platonic solid, and indicate the number of vertices, edges, and faces.

4. Explain why a **soccer ball** is **not** perfect. How many vertices, edges, and faces does it have? Verify that Euler's formula relating V,E, and F is also valid for a soccer ball.