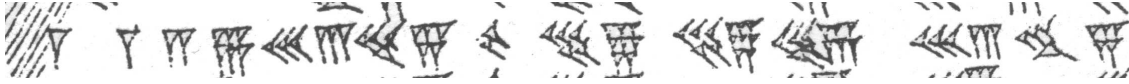## Mathematics 446 — Spring 2005 — fourth assignment

This is due next Monday, January 31.

1. The following line from the table mentioned in last week's assignment is said by Knuth somewhere not to be correct. Is it or not? Explain your answer.



2. Memorize the Greek alphabetic numeral system.

3. Read the selection in English from Archimedes that I handed out in class, as well as the account by Arndt and Haenel. Write up Archimedes' procedure in your own words, taking no more than one page, explaining the reference by Arndt and Haenel to recursion, and tying it in explicitly to the original by Archimedes. You shoulkd think of this as a guide to reading Archimedes.

4. In the selection in Greek, find all the numbers in it, and tell what they are in decimal. (Refer to them by page and line, writing them first as the Greek text does, then in decimal.)

5. Use Archimedes' technique to find the inner and outer perimeters for polygons of $768$ sides.

6. How many sides of the hexagon would you need to get the difference between inner and outer perimeters to be less than $10^{-8}$? $10^{-16}$?

7. The text of the English Archimedes refers to Euclid VI.3. Locate the statement on the internet and rewrite Euclid's statement and proof in your own words with lots of pictures. Your aim is to convince me you understand why the result is true. Include whatever you need to do that. Only do the part that Archimedes needs—that if we bisect the angle then the ratios have the property they are supposed to.