Homework due on Thursday, March 18

Read carefully chapters 3,4,5 of Dunham's book and chapter 15 in the book by Berlinghoff and Gouvea. Also solve the following problems.

Problem 1. a) What number is represented by the continued fraction [1, 2, 3, 1, 2, 3, 1, 2, 3, ...]? Justify your answer.

b) Find a continued fraction expansion of 104348/33215. Do not use calculators.

c) Find the continued fraction expansion of $\sqrt{7}$. Justify your answer.

Problem 2. a) Read Proposition 5 in Book 2 of the Elements. Explain how this proposition implies the inequality $(a + b)/2 \ge \sqrt{ab}$.

b) Read Proposition 2 and its proof in Book 12 of the Elements. Then write the proof in your own words and explain the use of the method of exhaustion.

c) Proposition 11 in Book 4 of the Elements provides a construction of a regular pentagon inscribed in a given cricle. Write this construction in your own words and justify that it is correct.

Problem 3. Read Chapter 15 in the book by Berlinghoff and Gouvea. Then read the Remark at the end of Book 13 of the Elements. It contains a proof that there are only 5 Platonic solids. Explain the idea of this proof.