HISTORY (MATH 4820): Some Practice Problems.

(1) State and prove the Pythagorean Theorem.

(2) Define the following.
   (a) Greatest common divisor.
   (b) Diophantine equation.
   (c) Irrational number.
   (d) Transcendental number.
   (e) Euclidean field.

(3) Give an example of
   (a) A Diophantine equation.
   (b) An irrational number expressed in the form of a continued fraction.
   (c) A Euclidean field.
   (d) An integer $n > 2$ such that the regular n-gon cannot be constructed with straightedge and compass.

(4) Suppose that a $1 \times x$ rectangle has the property that after subtracting a single maximal subsquare one is left with a rectangle similar to the original.
   (a) What is x?
   (b) Explain why x is an irrational constructible number.
   (c) Give a construction for x.

(5) Explain how to construct a regular pentagon.

(6) (a) Which positive number is represented by the continued fraction $[1; \overline{1}]$?
   (b) Let a be a positive integer. What is the continued fraction expansion for a positive root of $x^2 - ax - 1 = 0$?

(7) Solve $17x + 43y = 1$.