HISTORY (MATH 4820): REVIEW SHEET 2

I. Math topics.
   (a) The Chinese Remainder Theorem.
   (b) The solution of cubic and quartic equations.
   (c) Higher order polynomial equations: Bring radicals, the work of Lagrange, Ruffini, Abel, and Galois.
   (d) Constructions of the projective plane, change of coordinates in the projective plane.
   (e) Homogenization of curves.
   (f) Projective transformations.
   (g) All irreducible conics are projectively equivalent in $\mathbb{CP}^2$.
   (h) Bézout's Theorem.
   (i) Intersection multiplicity.
   (j) Hilbert's 1st problem: the continuum hypothesis. (Formulation in terms of $\aleph$s. The work of Gödel and Cohen.)
   (k) Hilbert's 3rd problem: equidecomposability of polyhedra. (The Wallace-Bolyai-Gerwien Theorem, Dehn's solution, Dehn invariant.)
   (l) Hilbert's 7th problem: transcendence of α^β.
   (m) Hilbert's 10th problem: give an algorithm to determine whether Diophantine equations have integer solutions.

II. History topics.
   (a) Who are the key figures in the discovery of the cubic formula?
   (b) Who first discovered how to solve quartic equations?
   (c) What are Bring radicals, and why are they interesting?
   (d) Who are the key figures in the discovery that the general quintic is not solvable by radicals?
   (e) What was Hilbert's 1st problem, and how was it resolved? Who were the key figures?
   (f) What was Hilbert's 3rd problem, and how was it resolved? Who were the key figures?
   (g) What was Hilbert's 7th problem, and how was it resolved? Who were the key figures?
   (h) What was Hilbert's 10th problem, and how was it resolved? Who were the key figures?
   (i) Name three mathematical results or concepts named after someone other than the originator.

General advice on preparing for a math test.

Be prepared to demonstrate understanding in the following ways.

(i) Know the definitions of new concepts, and the meanings of the definitions.

(ii) Know the statements and meanings of the major theorems.

(iii) Know examples/counterexamples. (The purpose of an example is to illustrate the extent of a definition or theorem. The purpose of a counterexample is to indicate the limits of a definition or theorem.)

(iv) Know how to perform the different kinds of calculations discussed in class.

(v) Be prepared to prove elementary statements. (Understanding the proofs done in class is the best preparation for this.)

(vi) Know how to correct mistakes made on old HW.