

## Mathematics 3010, Summer 2009: Chapter 18,19,21 Problems

### History

1. (Ch. 18) According to Bernoulli, when is an event "morally certain"?
2. In the Arithmetica Universalis, Newton says what about Cardano's formula?
3. What non-European mathematician discovered determinants?
4. How did Maclaurin determine that every odd degree polynomial has a real root?
5. What rule for manipulation of square roots did Euler fail to note does not hold for complex numbers?
6. How do Euler's solutions to Diophantus' problems differ from the original solutions?
7. What sort of mathematics was used in the Americas in the 18th century? Examples?
  8. (Ch. 18) What unit did De Moivre use to measure deviation from the center?
  9. How many different proofs did Gauss give of the quadratic reciprocity theorem?
  10. Under what name did Sophie Germain correspond with Gauss?
  11. Who presented a proof (incorrect) of Fermat's Last Theorem in the mid 1800s?
  12. Who first proved that certain regular  $n$ -gons could not be constructed?
  13. Describe Kummer's example of non-unique factorization.
  14. Who was first to prove that the quintic is not solvable by radicals?
  15. Why are commutative groups known as Abelian?
  16. State Pierpont's rule for constructibility of regular  $n$ -gons via conic sections.

### Mathematics (write and turn in)

1. Solve the cubic  $x^3+3x+2=0$  using Lagrange's method.
2. Which numbers are quadratic residues with respect to 13?
3. What is the multiplicative inverse of 3 in the group of residues modulo 7?