

## Math 489 Test 2 Topics List 28-Mar-08

Test covers Ch 8, 9, 10.1, 10.2, 10.4, Ch 11, Ch 12, 17.1, 17.2

\* denotes major importance

Math: 3 questions

1. \* Find one real root of a specific cubic  $x^3 + ax + b = 0$  using a calculator but no program.
2. \* Be able to reduce a specific cubic  $x^3 + px^2 + qx + r = 0$  to  $z^3 + az + b = 0$  and given a solution to the latter equation find a solution to the former.
3. Fibonacci sequence
4. Fermat's method of infinite descent and proof of Pythagorean Thm for  $n=4$ .
5. Fermat's method of finding extrema.
6. Cavalieri's principle and its use.
7. Barrow's proof of the Fundamental Theorem.
8. Manipulation of power series.
9. Cauchy's  $\epsilon$ - $\delta$  proofs.
10. Dedekind cuts.
11. Wave equation & solutions

\* At least one of these will appear (with numbers)

History: 2

1. Negative and complex numbers, who, what, when.
2. Development of algebraic symbolism (Diophantus, Jordanus, Viète, etc.)
3. Analytic geometry: Make a case for one of the following: i) Fermat and Descartes independently invented analytic geometry; ii) Fermat is primarily responsible for the invention of analytic geometry; iii) Descartes is primarily responsible for the invention of analytic geometry.
4. Napier Logarithms –explain development of logs (including NapLog in terms of modern natural and common logarithm) and their impact on science
5. \* Invention/Discovery of calculus:
  - a) Summarize history: who did what when in the invention of calculus, including order that derivatives, integrals & power series developed.
  - b) Explain why Indian work on power series has been largely ignored by historians of mathematics.
  - c) Explain why Newton and Leibniz are considered the inventors.
  - d) Development of rigor in calculus including limit concept.

\* At least one of these will appear

People: 1 (know within what century he worked and where, major areas of work, impact)

1. Fibonacci
2. Tartaglia
3. Ferrari
4. Cavilieri
5. Isaac Barrow
6. Newton
7. Leibniz