**History of Mathematics -- Final Exam**

**Name: .**

**Part 1: Definitions**

Define the terms below, ensure that each definition only uses terms available in the year indicated.

1. (3 pts) Method of fluxions (17th century):

* Rule 1, Newton’s *De Analysi*

1. (2 pts) commensurable (300 BC):
2. (3 pts):

* Denumerable:
* List three denumerable sets (cannot include **N**):

1. (2 pts) Limit (formal symbolic definition):

* Who came up with this definition and in what century?

**Part 2: Questions**

1.(5 pts) Given , what will the coefficient be in front of the term? If you use a theorem, state the theorem and who proved it.

2. (10 pts) What two theorems did Newton use when approximating the value of ? State the theorems and how/why he used them in the proof?

* Theorem 1:
* Why?
* Theorem 2:
* Why?

3. (5 pts) What is the Little Fermat Theorem? State is precisely, What are two of the three theorems used in the proof of this?

4.(5 pts) Is prime? We have seen two ways that Euler has proved this, describe one of the two ways in detail. You do not need to prove it.

5. (5 pts) What is a Mersenne prime? What is a Fermat prime?

6. (5 pts) What function can we manufacture to create a one-to-one correspondence between the natural numbers **N** and the set of all integers **Z**?

7. (10 pts) Who has been your favorite mathematician to study? State their name, their location, their century, and name at least two contributions to the field of mathematics they made.

**Part 3: Formal Proofs**

**Please write each proof as formal as necessary. Explain well, give details.**

1. (15 pts) Prove that the Harmonic Series diverges to infinity.

2. (15 pts) Prove the Pythagorean Theorem, you may use any proof you like, but state the mathematician and century it was proven.

3. (15 pts) State two theorems about prime numbers, state who proved them and in what century. Prove both.

4. (Extra Credit- 15 pts) Perform the depressing process for a generic quadratic equation. Use this to prove the quadratic formula.