Exam 2 Essay Questions

On the day of your exam, I will choose 4 of these 6 problems. You will have to write on 3 of the 4 chosen problems.

1. Prove that there are infinitely many prime numbers, and prove that $\sqrt{2}$ is irrational.

2. Write a few paragraphs on the history of prime numbers. Also, state Goldbach's conjecture, the twin prime conjecture, and the prime number theorem.

3. Discuss how al-Khwarizmi would have solved $x^2 + 10x = 39$. Include pictures. (The numbers may change on exam day.)

4. Discuss Archimedes. Include a discussion on the method of exhaustion.

5. Discuss one of Zeno's paradoxes, and explain Madhava of Sangamagrama's result (its statement and proof) that proves that Zeno's logic was flawed.

6. Pick one of the mathematicians below. Write what we know about them (or at least, what we think we know) and about their place in math history.

   (a) Sophie Germain   (c) Evariste Galois
   (b) Niels Abel   (d) Emmy Noether