Extra Credit Proofs

Block 1 (Due by Exam 2)

1) Prove $\sqrt{2}$ is irrational.

Block 2 (Due by Exam 3)

1) Prove that the rational numbers are countable.

2) Prove that the real numbers are uncountable.

3) Give geometric proofs for ...

$$\sum_{k=1}^{n} k \quad , \quad \sum_{k=1}^{n} k^2 \text{ , and } \sum_{k=1}^{n} k^3$$

Block 3 (Due by Final Exam)

1) Find a recurrence relation for the number of ways to parenthesize the n products of $n+1$ numbers.

2) Prove the Fundamental Theorem of Arithmetic.

3) Prove there are infinitely many primes.

4) Prove Pascal's Identity.

5) How many possible values to m and n are there so that 18^{10} is the least common multiple of m, n, and 6^{10} where m and n are distinct.