Math 435 Number Theory I
Problem Set 2

Due: Friday September 9: Do 3 of the following problems.

All work should be shown. Proofs should be written clearly in complete sentences.

Important Dates

Midterm 1: Friday September 30
Midterm 2: Friday November 11
Final Exam: Friday December 9, 8:00 am

1) Suppose $\gcd(a, b) = 1$, $a|c$ and $b|c$. Give two proofs that $ab|c$, one using the Fundamental Theorem of Arithmetic and one not.

2) Find a positive integer n such that $n/2$ is a square, $n/3$ is a cube and $n/5$ is a fifth power.

3) It is unknown if there are infinitely many primes p such that p and $p + 2$ are prime. Prove that 3 is the only prime such that p, $p + 2$ and $p + 4$ are prime.

4) (Programming Project) Write a computer program which when given positive integers a, b, c will decide if the equation $aX + bY = c$ has a solution and will find a solution if there is one. Use the program to find a solution to each of the equations:

$$171X + 311Y = 1$$

$$572470376X + 597730781Y = 4536266$$