December 23, 2004

EXAM 2 MATH 431

Problem 1. Let p be a prime. (i) Show that $(a+b)^p = a^p + b^p \pmod{p}$. (ii) Is it possibel that $\binom{p}{k} = 2 \pmod{p}$?

Problem 2. Solve the simultaneous equations:

$$x = 3 \pmod{37}$$
$$x = 1 \pmod{87}$$

Problem 3. Let a, b, c be primitive solutions of the equation

$$a^2 + b^2 = c^2.$$

Is it possible that both a and b are even? Is it possible that both a and b are odd?

Problem 4. State and prove your favorite Theorem that you leaned in this course.