

MATH 104B, PRACTICE MIDTERM 2, WINTER 2003.

1. Determine which numbers in the list 700, 270, $22100 = 2 \times 5 \times 13 \times 17$ can be written as a sum of two squares, and write those that can be as sums of two squares.
2. Prove that $\left(\frac{2}{p}\right) = (-1)^{(p^2-1)/2}$.
3. Describe the primes p which divide $x^2 + 5$ for some value of x .
4. Suppose that a_1, \dots, a_k are positive numbers and define $C_k = [a_0, \dots, a_k]$. Show that $C_k = p_k/q_k$ where for $k \geq 3$, p_k and q_k satisfy $p_k = a_k p_{k-1} + p_{k-2}$ and $q_k = a_k q_{k-1} + q_{k-2}$.
5. For the fraction $61/19$, calculate the continued fraction and all the convergents, and solve the diophantine equation $61x - 19y = 1$.