Homework Problems, due Nov. 6, 2012

1. For positive integers $m, n$ show that $3^m | 2^n - 1$ if and only if $2 \cdot 3^{m-1} | n$.

2. For positive integers $m, n$ with $m \geq 3$, show that $2^m | 3^n - 1$ if and only if $2^{m-2} | n$.

3. Is $\log 2 / \log 3$ transcendental?

4. Using results we either proved or stated without proof, show that for given positive integers $a, b, k$ there is a computable number $N(a, b, k)$ such that the number of pairs of positive integers $m, n$ with $0 < |a^m - b^n| \leq k$ is at most $N(a, b, k)$. 