Given two natural numbers, write a program to find their quotient using only addition, subtraction, doubling, halving, test for even, and comparisons.

After trying the question, scroll down to the solution.
§ I suppose the question means the natural part of the quotient, discarding the remainder.
Let $n$, $m$, and $q$ be natural number variables. We want $q' = \text{div } n m$.

$q' = \text{div } n m \iff$
- if $n < m$ then $q := 0$
- else $n := n - m$. $q' = \text{div } n m$. $q := q + 1$

That solution takes time $\text{div } n m$. Let's try for better.

$q' = \text{div } n m \iff$
- if $n < m$ then $q := 0$
- else if even $n$ then $n := n / 2$. $q' = \text{div } n m$. $q := q \times 2$
- else $n := n - m$. $q' = \text{div } n m$. $q := q + 1$

That solution takes time something like $\log n$. 