1077-51-488 **Michael Beeson*** (`beesonpublic@gmail.com`). *Tiling a triangle with congruent triangles.*

We investigate the problem of cutting a triangle ABC into N congruent triangles (the "tiles"), which may or may not be similar to ABC. We wish to characterize the numbers N for which some triangle ABC can be tiled by N tiles, or more generally to characterize the triples (N, T) such that ABC can be N-tiled using tile T. In the first part of the paper we exhibit certain families of tilings which contain all known tilings. We conjecture that the exhibited tilings are the only possible tilings. If that is so, then for there to exist an N-tiling of any triangle ABC, N must be a square, or 2, 3, or 6 times a square, or a sum of two squares. We have proved the result except for a certain class of exceptional triangles and certain values of N. For example, we have proved that there are no N-tilings of any triangle when $N = 7, 11$, or 19; and we have completely solved the case when ABC is similar to T. We made use of linear algebra and field theory, and for one case, the algebraic number theory of cyclotomic fields. The simplest unsolved case is $N = 28$, with a tile whose sides are 2, 3, and 4, and triangle ABC has sides 12, 14, and 16. (Received September 04, 2011)