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Greg Martin* (gerg@math.ubc.ca), Dept. of Mathematics, UBC, Room 121, 1984 Mathematics Road, Vancouver, BC V6T 1Z2, Canada. *Dense Egyptian fractions.*

An Egyptian fraction is a sum of reciprocals of distinct positive integers. How many terms can we have in an Egyptian fraction that sums to 1, for example, if we limit the size of the denominators? It can be shown that the number of terms can be extremely large; in fact, we will see the best possible result about the density of the set of denominators. Consider also the following problems posed by Erdős and Graham: the set of integers that cannot be the largest denominator of an Egyptian fraction representation of 1 is infinite - what is its order of growth? How about those integers that cannot be the second-largest (third-largest, etc.) denominator of such a representation? We will see the answers to these questions as well, including the one theorem I have ever proved that I think would have surprised Paul Erdős. All these results extend to representations of any positive rational number in place of 1. (Received October 24, 2008)