Part and Whole

Level E

A unit fraction has a numerator of one and a natural number denominator. Find five unique unit fractions that sum to 1.

Determine if there are more sets of five unique unit fractions that sum to 1. If so, determine a general method for finding other sets. If not, explain why not.

What other n number of unique unit fractions can be found that sum to 1? Explain your reasoning and justify your conclusions.

Except for 1 and $\frac{1}{2}$, fractions can be broken into unit fractions that result in a sum of 1 using the following generalization,

$\frac{1}{a} = \frac{1}{(a+1)} + \frac{1}{a(a+1)}$ where a > 0.

Verify this algebraic identity.

How can you use the identity above to write n number of unit fractions that result in a sum of 1?