

# November 2022 Problem of the Month

Let  $A$  be the set of positive integers that contain only the digits 1 or 2. We then define the following sum.

$$S = \sum_{n \in A} \frac{1}{n} = \frac{1}{1} + \frac{1}{2} + \frac{1}{11} + \frac{1}{12} + \frac{1}{21} + \frac{1}{22} + \frac{1}{111} + \dots$$

- How many elements of set  $A$  contain exactly  $n$  digits? Your answer should be in terms of  $n$ .
- Show that  $S \leq 3$ . You may want to use part (a).
- Find both upper and lower bounds as accurate as you can for  $S$ .

Please email solutions to Dr London at [slondon@luc.edu](mailto:slondon@luc.edu) in PDF form by 11:59 pm on November 30.



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