

# Challenge of the Week

*Problem #4 - October 26 to November 6, 2015*

(a) The fraction  $10/11$  can be easily split into the sum of 10 identical positive fractions all with the numerator 1:  $10/11 = 1/11 + \dots + 1/11$ . Is it possible to split  $10/11$  into the sum of 10 **distinct** regular fractions all with the numerator 1? If so, then show, with a justification, such a representation (put the summands in decreasing order). If such a representation is impossible, prove that.

(b) Is it possible to represent the same fraction  $10/11$  as the sum of 11 **distinct** positive regular fractions all with the numerator 1? If so, show, with a justification, such a representation (put the summands in decreasing order). If such a representation is impossible, prove that.

(c) Is it always possible to represent an arbitrary regular fraction  $m/n$ , with  $10 < m < n$ , as the sum of  $m$  **distinct** positive regular fractions all of which have the numerator 1? If it's always possible, prove that. If it's impossible for some fraction  $m/n$ , show such a fraction and justify your claim.

*Direct any questions to Gregory Galperin, OM 3361.*

## Rules and Awards

- Any undergraduate currently enrolled at EIU is eligible to participate.
- Each solution is to be the work of one individual and is to be submitted with the solver's name, year in school, email address, local address and home address.
- Each solution is to be written or typed and is due in the main Mathematics Department office (OM3611) by 2:00 p.m., Friday, November 6, 2015.
- Entries will be judged on the basis of clarity of exposition and elegance of solution. That is to say, the *explanation* is more important than the answer.
- An Award of \$25 will be given for the best solution. In the case of a two-way tie, the award will be evenly split. If there are more than two 'best' solutions, a drawing will be held for the reward. In the case no award is made for this challenge, \$25 will be added to the next challenge.
- Challenges, solutions, names of all solvers, and comments will be posted on the Challenge of the Week homepage:  
<http://www.eiu.edu/math/challenge.php>.