

PROBLEM OF THE MONTH #2

NOVEMBER 2013

Directions: Write a complete solution to the problem below showing all work. Your paper must have your name, W#, and Southeastern email address. Solutions are to be placed in the envelope for Problem #2 located in the Department of Mathematics Office, Fayard 308 by 4:30 p.m., **Wednesday, December 4**. No late papers will be accepted.

All papers with a correct solution will be entered in a drawing for a great prize!

Questions concerning the problem of the month should be sent to either Dr. Tilak de Alwis (tdealwis@selu.edu), or Dr. Randy Wills (rwills@selu.edu)

Problem: *All ones!*

A **repunit** is a positive integer all of whose digits are 1's. Let $R_n = 11 \dots 1$ (*this number has $n - ones$*) be the n^{th} repunit where $n = 1, 2, \dots$. For example, $R_1 = 1, R_2 = 11, R_3 = 111$, etc.

A linear combination of repunits is a sum of the form

$\sum_{i=1}^k c_i R_i$ where c_i are real numbers, and k is positive integer.

Write R_n^2 as a linear combination of the repunits, where n is an arbitrary positive integer.

