PROBLEM OF THE MONTH #2

SEPTEMBER 2015

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, September 30**. 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:

Suppose p is a nonzero real number. Let $\alpha, \beta, and\ \gamma$ be the three roots of the cubic equation

$$x^3 + px^2 + p^{-1}x + p^{-2} = 0$$

Find the exact value of $\alpha\beta^2 + \alpha^2\beta + \beta\gamma^2 + \beta^2\gamma + \gamma\alpha^2 + \gamma^2\alpha$

Simplify your answer completely.