Problems ♡–3

Due in DSC 235 or DSC 247 by 12 noon, Friday, September 29, 2017

Problem A: Let x, y, and z be roots of the equation

$$x^3 + ax^2 + bx - ab = 0,$$

where a and b are real numbers. Find $(x+y)(x+z)(y+z)$. (You have to show all your work and/or justify your answer.)

Problem B: Prove that if $\frac{1}{a+b+c} = \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$, then

$$\frac{1}{a^n + b^n + c^n} = \frac{1}{a^n} + \frac{1}{b^n} + \frac{1}{c^n} \quad \text{for any odd } n.$$

RULES:

- The competition is open to all *undergraduate* UNO students.
- Please submit your solutions to Slava Rykov in DSC 247 or to his mailbox or to Andrzej Roslanowski in DSC 235. (Needless to say, they should be be written clearly and legibly.)
- The winners will be determined each semester based on the number of correct solutions submitted.
- Problems will be posted by Friday 5pm and the solutions are due by the following Friday 12 noon.

PRIZES:

- Winners will received books published by the American Mathematical Society. The titles actually awarded will be selected in cooperation with the awardees.
- In Summer 2018, there is a research opportunity possibly that could lead to an Erdős Number (3 or possibly 2). Strong performance in POW is one of the crucial prerequisites.