

# ACMS Problem Solving Seminar - Fall 2005

## Presentation Material 1 - Introductory Problems

Giovanni DiMatteo

**Note:** The following example problems will be solved for everyone to see at the first seminar meeting. Seeing their solutions will help you develop the skills to reproduce proofs just as clever and short! Please attend the ACMS Problem-Solving Seminar next week, Thursday from Noon-1pm in Palenske 225. After having seen the example problems below solved, we'll hand out an introductory problem set for you to try! <sup>1</sup>

1. Let  $x, y$ , and  $z$  be complex numbers satisfying  $x^2 + y^2 + z^2 = 5$  and  $xy + yz + xz = 2$ . Find all possible values of  $x + y + z$ . (MATH Challenge 2003)
2. Is it possible for a knight to go (by allowable moves) from the lower-left hand corner of the board to the upper-right hand corner and in the process to light exactly once on each square?
3. If we remove two opposite squares of an  $8 \times 8$  chess board, Is it possible to tile the remaining board with  $1 \times 2$  (non-overlapping) dominoes?
4. Prove that if the numbers  $1, 2, \dots, 12$  are randomly positioned around a circle, then some set of three consecutively positioned numbers must have a sum of at least 19.
5. Basketball star Shanille O'Keal's team statistician keeps track of the number,  $S(N)$ , of successful free throws she has made in her first  $N$  attempts of the season. Early in the season,  $S(N)$  was less than 80% of  $N$ , but by the end of the season,  $S(N)$  was more than 80% of  $N$ . Was there necessarily a moment in between when  $S(N)$  was exactly 80% of  $N$ ? (Putnam 2004, A1)

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<sup>1</sup>Visit [www.albion.edu/mathematicalsociety/Seminar.htm](http://www.albion.edu/mathematicalsociety/Seminar.htm) for more information about our Problem-Solving Seminar!