

THE PROBLEM SOLVING COMPETITION PROBLEMS FOR MARCH'08

1. Squares in Various Bases

Problem provided by Mike Pinter, Belmont University

Suppose n is a base 10 number. Note that n^2 ends with 0 if and only if n ends with 0. Now consider numbers written in base b , where $5 \leq b \leq 9$. Determine for which b (if any) the following statement is true: For any number n , n^2 ends with 0 if and only if n ends with 0.

For each base b , provide a proof if the statement is true, or a counterexample if the statement is false.

2. Towering Exponential

Problem provided by Richard Neal, Editor *The Problem Solving Competition*

Calculate the derivative with respect to x of the function

$$y = x^{x^x}.$$

Copies available below! Feel free to take one! Submit your solutions to any of the Math Professors at school by **April 11**. You can also find a copy at the Math Club website at

<http://faculty.randolphcollege.edu/ykurt/mathclub/mathclub.htm>.

About the The Problem Solving Competition

This is a national problem solving competition organized by Dr. Richard Neal, president of ASM (American Society for Mathematics). Every month two problems are sent out to schools and posted for students to solve. Winners of the month are presented with a certificate and the top problem solvers qualify to attend the US National Collegiate Mathematics Championship to be held in Madison, Wisconsin, in August of 2008. The problems are posted at the Ethyl Center and copies are provided for you to pick up! Enjoy! For more information about ASM and the competition go to <http://www.ascm.org/>