

The Problem Solving Competition—March 2013

Problem A: Squares in Various Bases

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 bases 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.

Problem B: Towering Exponential

Calculate the derivative with respect to x of the function $y = x^{x^x}$.

Please submit your solutions to Dr. Huiya Yan at hyan@uwlax.edu, or 1013 Cowley Hall by March 31, 2013. Winners can get a certificate from American Society for Mathematics.