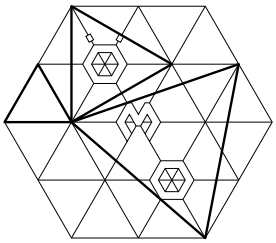

# 33rd Austrian Mathematical Olympiad

## Beginner's Competition

June 13, 2002

1. We calculate the sum of 7 consecutive even natural numbers (e.g., $2+4+6+8+10+12+14$) and call it $A$, then the sum of the following 7 even numbers (here $16+18+\cdots$) and call it $B$ and finally again the sum of the following 7 even numbers and call it $C$.

   Can their product be $ABC = 2002^3$?

2. Show that no positive real number $x$ exists such that

$$x^{\lfloor x \rfloor} = \frac{9}{2}.$$

3. Determine all real numbers $x$ that satisfy the following inequality.

$$|x^2 - 4x + 1| > |x^2 - 4x + 5|.$$

4. In a trapezoid $ABCD$ with base $AB$ let $E$ be the midpoint of the side $AD$. Further assume that $2\overline{CD} = \overline{EC} = \overline{BC} = b$. Let the angle $ECB$ be $120°$.

   Construct the trapezoid ad determine its area as a function of $b$.