



35th Austrian Mathematical Olympiad  
Beginner's Competition  
June 15, 2004

1. Determine the smallest four-digit number that when divided by 3 gives a four-digit number with the same digits.

(Note: Four-digit means that the first digit must not be 0.)

2. For which integer pairs  $(x, y)$  does the inequality

$$x^2 + 5y^2 - 6 \geq \sqrt{(x^2 - 2)(y^2 - 0.04)}$$

hold?

3. Determine the value of the parameter  $m$  such that the equation

$$(m - 2)x^2 + (m^2 - 4m + 3)x - (6m^2 - 2) = 0$$

has real solutions, and the sum of the third powers of these solutions equals zero.

4. Of a rhombus (diamond)  $ABCD$  we know the circumradii  $R$  of  $\triangle ABC$  and  $r$  of  $\triangle BCD$ . Construct the rhombus.