

**Croatia Team Selection Test 2004**

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by niraekjs

1 Find all pairs  $(x, y)$  of positive integers such that  $x(x + y) = y^2 + 1$ .

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2 Prove that if  $a, b, c$  are positive numbers with  $abc = 1$ , then

$$\frac{a}{b} + \frac{b}{c} + \frac{c}{a} \geq a + b + c.$$

3 A line intersects a semicircle with diameter  $AB$  and center  $O$  at  $C$  and  $D$ , and the line  $AB$  at  $M$ , where  $MB < MA$  and  $MD < MC$ . If the circumcircles of the triangles  $AOC$  and  $DOB$  meet again at  $K$ , prove that  $\angle MKO$  is right.

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