

Austrian Mathematical Olympiad Junior Regional Competition 2020

www.artofproblemsolving.com/community/c1666594

by sqing, parmenides51

- 1 Let a be a real number and b a real number with $b \neq -1$ and $b \neq 0$. Find all pairs (a, b) such that

$$\frac{(1+a)^2}{1+b} \leq 1 + \frac{a^2}{b}.$$

For which pairs (a, b) does equality apply?
(Walther Janous)

- 2 How many positive five-digit integers are there that have the product of their five digits equal to 900?

(Karl Czakler)

- 3 Given is an isosceles trapezoid $ABCD$ with $AB \parallel CD$ and $AB > CD$. The projection from D on AB is E . The midpoint of the diagonal BD is M . Prove that EM is parallel to AC .

(Karl Czakler)

- 4 Find all positive integers a for which the equation $7an - 3n! = 2020$ has a positive integer solution n .

(Richard Henner)
