ROMANIAN MATHEMATICAL MAGAZINE

**In $\Delta ABC$ the following relationship holds:**

$$\frac{\tan(A)+\tan(B)}{tan^2(C)}+\frac{\tan(B)+\tan(C)}{tan^2(A)}+\frac{\tan(A)+\tan(C)}{tan^2(B)}\geq 2\sqrt{3}$$

*Proposed by Nguyen Hung Cuong-Vietnam*

*Solution by Mirsadix Muzefferov-Azerbaijan*

$$\sum_{cyc}\frac{\tan(A)+\tan(B)}{tan^2(C)}=\sum_{cyc}\frac{\frac{\sin(A+B)}{\cos(A).\cos(B)}}{tan^2(C)}=\sum_{cyc}\frac{cos^2(C).\sin(C)}{sin^2(C).\cos(A).\cos(B)}=$$

$$=\sum_{cyc}\frac{cos^2(C)}{sin(C).\cos(A).\cos(B)}\overset{AM-GM}{\geq}$$

$$\geq 3\left(\frac{cos^2(A).cos^2(B).cos^2(C)}{sin(A).\sin(B).\sin(C).cos^2(A).cos^2(B).cos^2(C)}\right)^{\frac{1}{3}}=$$

$$=3\left(\frac{1}{\prod_{cyc}\sin(A)}\right)^{\frac{1}{3}}\geq 3\left(\frac{1}{\frac{3\sqrt{3}}{8}}\right)^{\frac{1}{3}}=3\left(\frac{8}{\sqrt{27}}\right)^{\frac{1}{3}}=2\sqrt{3}$$

$$Equality\ \ holds\ \ for\ \ a=b=c.$$