ROMANIAN MATHEMATICAL MAGAZINE

In ΔABC the following relationship holds:

$$\frac{a^3}{(b+c)^3-a^3}+\frac{b^3}{(c+a)^3-b^3}+\frac{c^3}{(a+b)^3-c^3}\geq\frac{3}{7}$$

Proposed by Nguyen Hung Cuong-Vietnam

Solution by Tapas Das-India

$$LHS=\sum\frac{(b+c)^3}{(b+c)^3-a^3}-3=\sum\frac{1}{1-\left(\frac{a}{b+c}\right)^3}-3\overset{Bergstrom}{\geq}$$

$$\geq\frac{9}{3-\sum\left(\frac{a}{b+c}\right)^3}-3\overset{CBS}{\geq}\frac{9}{3-\frac{1}{9}\sum\left(\frac{a}{b+c}\right)^3}-3\overset{Nesbitt}{\geq}$$

$$\geq\frac{9}{3-\frac{1}{9}\cdot\frac{27}{8}}-3=\frac{24}{7}-3=\frac{3}{7}$$

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