ROMANIAN MATHEMATICAL MAGAZINE

$$If\ \ x_1, x_2, x_3 \dots x_n > 0, \qquad n \geq 3\ \ then:$$

$$\sum_{cyc} \frac{x_1 + x_2}{x_3 + x_4 + \cdots + x_n} \geq \frac{2n}{n-2}$$

Proposed by Marin Chirciu-Romania

Solution by Mirsadix Muzefferov-Azerbaijan

$$S = x_1 + x_2 + x_3 \dots + \ x_n$$

$$\sum_{cyc} \left(\frac{x_1 + x_2}{x_3 + x_4 + \cdots + x_n} + 1\right) - n = \sum_{cyc} \frac{S}{S - (x_1 + x_2)} - n =$$

$$S.\left(\sum_{cyc} \frac{1^2}{S - (x_1 + x_2)}\right) - n \overset{Bergstrom}{\geq} S.\frac{(1 + 1 + 1 \dots + 1)^2}{\sum_{cyc} S - \sum_{cyc}(x_1 + x_2)} - n =$$

$$= S.\frac{n^2}{nS - 2S} - n = \frac{n^2}{n-2} - n = \frac{2n}{n-2}$$

$$Equality\ \ holds\ \ for: \quad x_1 = x_2 = x_3 \dots = \ x_n$$