Proposed Solution to #U651 Undergraduate Problems, Mathematical Reflections 1 (2024)

Solution proposed by Prakash Pant, Mathematics Initiatives in Nepal, Bardiya, Nepal.

Problem Proposed by Marius Stănean, Zalău, România

Statement of the Problem:
Let x, y, z, t be real numbers such that x + y + z + t = 0. Prove that:

$$\frac{x+1}{x^2+3}+\frac{y+1}{y^2+3}+\frac{z+1}{z^2+3}+\frac{t+1}{t^2+3}\leq\frac{4}{3}$$

Solution of the Problem:
Let f(x) = $\frac{x+1}{x^2+3}$, We can compute f"(x) and see that $f''(x) < 0 \forall x \in$ -5