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Ser. Mat. 5 (1994), 61–62.

PROBLEM SECTION

Edited by Milan J. Merkle

We publish research problems in all areas of Mathematics that fall in one of the following categories:

a) Research problems or conjectures with a solution not known to the proposer.

b) Research problems seeking a new, more elegant solution (the proposer should submit his/her solution).

c) Inquiries about references and state of the art regarding a particular problem.

Problems should be submitted in a form that is easy to understand to a nonspecialist in a field. If using special terms or notations can not be avoided, they should be defined in a statement of a problem. A problem may be accompanied by a short comment (addressed primarily to specialists) that explains why the solution could be of an interest.

Solutions should be worked out in all reasonable details. Solvers should enclose a photocopy of the relevant part of any reference that appears in a solution.

Any solution or an answer to inquiry will be proceeded to the proposer immediately upon receiving.

Correspondence regarding Problem Section should be sent to:

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• **Problem 1.94** proposed by D.S. Mitrinović, Belgrade.

Let $x \mapsto f(x)$ be a continuously differentiable real function defined on $[0,1]$. Suppose that $f(0)=0$ and $0 < f'(x) \le 1$ for $x \in [0,1]$. Find real numbers p and q such that

$$\left(\int_0^1 f(x)\,\mathrm{d}x\right)^p \ge \int_0^1 f(x)^q\,\mathrm{d}x\ .$$

Comment. The inequality holds for $p=2$ and $q=3$, as indicated in *American Mathematical Monthly* **81** (1974), 1086–1095.

• **Problem 2.94** proposed by D. Đ. Tošić, Belgrade.

$$\text{Evaluate } \lim_{a\to 0+}\left(\int_{-1}^{1}\frac{\cos x}{x^4+a^4}\,\mathrm{d}x+\frac{\pi\sqrt{2}}{4a^3}(a^2-2)\right).$$

Generalization. Find the polynomial P_{n-1} with property

$$\lim_{a\to 0+}\left(\int_{-1}^{1}\frac{f(x)}{x^n+a^n}\,\mathrm{d}x-P_{n-1}\left(\frac{1}{a}\right)\right)=0,$$

where $z\mapsto f(z)$ is regular function in the disc containing the interval $[-1,1]$ and $n=2,3,\dots$

Comment. The problem is connected with an expansion of the integral in (1) into Laurent series with respect to a.

• **Problem 3.94** proposed by D.M. Milošević, Pranjani.

Prove or disprove:

$$\frac{y+z}{x}\cdot\frac{1}{{w_a}^2}+\frac{z+x}{y}\cdot\frac{1}{{w_b}^2}+\frac{x+y}{z}\cdot\frac{1}{{w_c}^2}\geq\frac{18}{s^2},$$

where w_a, w_b, w_c are anglebisectors and the semiperimeter of a triangle, and x, y, z are positive numbers.

Comment. The proposed inequality is a generalization of IX.11.1 in D.S. Mitrinović, J.E. Pečarić, V. Volonec, *Recent advances in Geometric Inequalities*, Kluwer, Dordrecht, 1989.

EDITORIAL NOTE

Several readers of our journal have informed us that the paper

B. Iričanin: *Some quadrature formulas for analytic functions* I, These Publications **4** (1993), 105–108.

contains some fallacies in the proof of its main resut. Details will be provided in one of the subsequent issues.