PROBLEMS

Problems, solutions, and any comments on the problems or solutions should be sent to the problem editor, whose address appears on the inside back cover. An asterisk (*) after a number indicates a problem submitted without a solution.

Problems which are new or interesting old problems which are not well–known may be submitted. They may range from challenging high school math problems to problems from advanced undergraduate or graduate mathematics courses. It is hoped that a wide variety of topics and difficulty levels will encourage a number of readers to actively participate in problems and solutions.

Problems and solutions should be typed or neatly printed on separate sheets of paper. They should include the name of the contributor and the affiliation. Solutions to problems in this issue should be mailed no later than May 31, 1991, although solutions received after that date will also be considered until the time when a solution is published.

25. *Proposed by Mohammad K. Azarian, University of Evansville, Evansville, Indiana.*

Let P be the free product with amalgamations of any collection $\{C_\gamma\}_{\gamma\in\Gamma}$ of infinite cyclic groups, where Γ is an indexing set of cardinality greater than one.

(a) Construct an element $h \in P$ and a subgroup $T < P$ such that $|P : T|$ is infinite but $|P :< h, T > |$ is finite.

(b) Is h uniquely determined? Is T uniquely determined?

This problem is related to the article by Mohammad K. Azarian, "On the Lower Near Frattini Subgroups of Amalgamated Free Products of Groups I" on page 105 of this issue.

26*. *Proposed by Stanley Rabinowitz, Westford, Massachusetts.*

Prove that

$$\sum_{k=1}^{38} \sin \frac{k^8\pi}{38} = \sqrt{19}\ .$$

27. *Proposed by Don Redmond, Southern Illinois University at Carbondale, Carbondale, Illinois.*

Show that

$$\int_1^{+\infty} \frac{t-[t]}{t^2(t+1)^2}(2t+1)dt = \log 2 - \frac{1}{2} \ ,$$

where $\log 2$ denotes the natural logarithm of 2 and $[t]$ is the greatest integer less than or equal to t.

28. *Proposed by Russell Euler, Northwest Missouri State University, Maryville, Missouri.*

Let ABC be an equilateral triangle with segment lengths as indicated in the diagram. Determine s as a function of a, b and c.