

PROBLEMS AND SOLUTIONS

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This section contains problems intended to challenge students and teachers of college mathematics. We urge you to participate actively *both* by submitting solutions and by proposing problems that are new and interesting. To promote variety, the editors welcome problem proposals that span the entire undergraduate curriculum.

Proposed problems should be sent to **Jerzy Wojdylo**, either by email (preferred) as a pdf, \TeX , or Word attachment or by mail to the address provided above. Whenever possible, a proposed problem should be accompanied by a solution, appropriate references, and any other material that would be helpful to the editors. Proposers should submit problems only if the proposed problem is not under consideration by another journal.

Solutions to the problems in this issue should be sent to **Chip Curtis**, either by email as a pdf, \TeX , or Word attachment (preferred) or by mail to the address provided above, no later than February 15, 2018.

PROBLEMS

1106. *Proposed by Greg Oman, University of Colorado, Colorado Springs, CO.*

Let G be a group, and let $S \subseteq G$. Further, let $S^{-1} = \{s^{-1} : s \in S\}$. Recall that S is a *generating set* for G if every member of G is a finite product of elements, each of which is a member of S or S^{-1} . Find all nontrivial groups G with the property that any two generating sets of G have nonempty intersection.

1107. *Proposed by Mehtaab Sawhney (student), Massachusetts Institute of Technology, Cambridge, MA.*

For nonnegative integers k and ℓ and a real number t , prove that

$$f(t) = \sum_{i=0}^{2\ell} \frac{(i+k)!}{k!i!(2\ell-i)!} t^i > 0.$$

1108. *Proposed by Francisco Javier García Capitán, Álvarez Cubero Secondary School, Córdoba, Spain.*

Given a triangle ABC with $\angle B > \angle C$, let L and L' on BC such that AL and AL' are the interior and exterior angle bisectors of the angle A , respectively. Construct the circle of Apollonius \mathcal{C} , which is the circle of diameter LL' , and let U be its center. On line BC ,

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