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 **Greg Oman**, 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 July 15, 2022. Sending both pdf and TEX files is ideal.

PROBLEMS

1216. *Proposed by Oluwatobi Alabi, Government Science Secondary School Pyakasa Abuja, Abuja, Nigeria.*

For an integer $n \geq 3$, find a closed form expression for the number of ways to tile an $n \times n$ square with 1×1 squares and $(n-1) \times 1$ rectangles (each of which may be placed horizontally or vertically).

1217. *Proposed by Eugen Ionascu, Columbus State University, Columbus, GA.*

Prove the following:

1. There exists a unique function $f : \mathbb{R} \to \mathbb{R}$ which satisfies the following equation for every $x \in \mathbb{R}$:

$$f(-x) = 1 + \int_0^x \cos(t) f(x-t)dt.$$

   Moreover, express f explicitly in terms of elementary functions.

2. For every non-negative integer k, $f^k(0) = (-1)^{\lfloor \frac{k+1}{2} \rfloor} F_k$, where $F_0 = 0$, $F_1 = 1$, $F_{k+2} = F_k + F_{k+1}$, and $\lfloor x \rfloor$ denote the greatest integer less than or equal to a real number x.

doi.org/10.1080/07468342.2021.1991163