Therefore

$$[2x] = [2[x] + 2f] = 2[x] + [2f]$$

and, transposing $[x]$, we have

$$[2x] - [x] = [x] + [2f].$$

But $[x] + [2f]$ is just $[x]$ when $f < \frac{1}{2}$ and $[x] + 1$ when $f > \frac{1}{2}$. Hence $[x] + [2f]$ always yields the integer nearest x and it follows that

$$\{x\} = [2x] - [x].$$

Ross Honsberger
Department of Combinatorics and Optimization
University of Waterloo
Waterloo, ON
rosshonsberger@rogers.com

Unsolved Crux Problem

As remarked in the problem section, no problem is ever closed. We always accept new solutions and generalizations to past problems. Recently, Chris Fisher published a list of unsolved problems from *Crux* [2010 : 545, 547]. Below is one of these unsolved problems:

714*. [1982 : 48; 1983 : 58] *Proposed by Harry D. Ruderman, Hunter College, New York, NY, USA.*

Prove or disprove that for every pair (p, q) of non-negative integers there is a positive integer n such that

$$\frac{(2n-p)!}{n!(n+q)!}$$

is an integer.

(This problem was suggested by Problem 556 [1980 : 184; 1981 : 189, 241, 282] proposed by Paul Erdős.)