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

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

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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:


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.)