UNIVERSITY OF WISCONSIN
PLATTEVILLE
DEPARTMENT OF MATHEMATICS

Problem of the Week #5

(Spring 2022)

Oneil Cruz, a shortstop for the Pittsburgh Pirates, had an OPS of 1.000 in Major League Baseball's 2021 season, according to MLB.com. The OPS statistic is a sum of two fractions: the on-base percentage and the slugging percentage. For Cruz, it looks like this sum is exactly equal to 1 — but it might not be, since the website rounds OPS to three decimal places.

Find the smallest integer N for which there are positive integers a, b, c, and d such that $b \le N$, $d \le N$, and $\left|\frac{a}{b} + \frac{c}{d} - 1\right|$ is in the open interval $(0, 0.0005)$.

[Please fully explain your answer.]

Email solutions to `kwonmi@uwplatt.edu` by 2:00pm on Wednesday, March 2, 2022.

Every week, the best solution submitted earns a $10 Platteville gift certificate; the top scorer each semester also wins a cash award. Good luck!

You can always see the Problem of the Week (and complete rules) online at:

`http://uwpmath.weebly.com/`