Orloj Cog

Problem. Explain how the periodic sequence $1, 2, 3, 4, 3, 2, 1, 2, 3, 4, 3, 2 \cdots$ (which bounces back and forth between 1 and 4) may be segmented, and the terms in each segment added together, to get the sequence $1, 2, 3, 4, 5, 6, 7, \cdots$.

For instance, 1 | 2 | 3 | 4 | 3 2 | 1 2 3 | 4 3 | 2 1 2 3 | 4 3 2 | 1 2 3 4 with its segments summed yields 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10. How to continue?

Use the periodicity of the $1, 2, 3, 4, \cdots$ sequence to conclude it suffices to check the pattern up to a certain point, then actually perform this check.

Submit your solution online by scanning QR code and filling out the form, or submit at

`sites.google.com/unomaha.edu/unopow`

A photo of handwritten work is fine. You can also turn in solutions physically at the UNO math department's mail room (located on the second floor of the Durham Science Center).