A prime-generating sequence using the Wilson's theorem

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Abstract

Here I present a prime-generating sequence based on the Wilson's theorem.

Keywords: prime sequence, Wilson's theorem

The sequence

Let k be a positive integer.

Let n be an integer such that $n = 6k - 1$

Let r be the remainder of the division of $(n-1)! - n$ by $(n+2)$

Property: if $6k+1$ is prime $r = 3k+2$

We define the prime $6k+1$ such that $6k+1 = r(n) + r(n-1)$ where $r(n)$ is the sequence of the successive remainders with $r(1) = 5$ and $n \geq 2$. We suppose $r(n) \neq 2$ and $r(n-1) \neq 2$.

For example the first 25 values of r are:

$5, 8, 11, 2, 17, 20, 23, 2, 2, 32, 35, 38, 41, 2, 2, 50, 53, 56, 2, 2, 65, 2, 71, 2, 77$

And we have:

$8 + 5 = 13 = 6(2) + 1$

$11 + 8 = 19 = 6(3) + 1$

$20 + 17 = 37 = 6(6) + 1$

$23 + 20 = 43 = 6(7) + 1$

$35 + 32 = 67 = 6(11) + 1$

$38 + 35 = 73 = 6(12) + 1$

$41 + 38 = 79 = 6(13) + 1$

$53 + 50 = 103 = 6(17) + 1$

$56 + 53 = 109 = 6(18) + 1$