Unit 15, part 76.9.4 Neubearbeitung.
In the debating club 373.1, second version
Primality test via
(f(n) ±1) modn = 0 ⇔ n is prime (1)
** …, Wilson [1,2]
((n-1)!+1) modn = 0 ⇔ n is prime (2)
** Conjecture
PT(1) connecting
$\Phi = \frac{1}{2}\left(\sqrt{5}+1\right)$ (golden ratio) [3,4] (3.1)
and prime numbers to

$$(\mathrm{int}(\Phi^n) - 1)\ \mathrm{mod} n = 0 \iff \text{n is prime}$$

n – odd nat. number, n≥ 5 (3.2)

$$(\mathrm{int}(\Phi^n) - 1)\ \mathrm{mod} 2n = 0 \iff \text{n is prime}$$

n – odd nat. number, n≥ 5 (3.3)

** Ver/fal/res equ.(3.2,3).
** Find more PT(1) with slimmer test bodies.
Numerical comparison of the test bodies:

n	equ. (2), $(n-1)!+1$	equ. (3), $\mathrm{int}(\Phi^n) - 1$
7	721	28
11	3628802	198
13	479001601	520
17	20922789888001	3570
19	640237370572800l	9348
23	112400072777760768000l	64078

A numeric check DScalc, **n=5(1)10000** shows
** Equs (3.2,3) are true for all 1227 n=prime in this interval; with other words: equs (3.2,3) generates/ recognizes all 1227 n=prime in this interval.

** But,
equ. (3.2) classifies 7 „cockoo's eggs“
nonprimes (705, 2465, 2737, 3745, 4181, 5777, 6721) as primes,
equ. (3.3) classifies 6 „cockoo's eggs“
nonprimes (2465, 2737, 3745, 4181, 5777, 6721) as primes.
Numeric check by DScalc
n=5(1)10000, equ. (3.2/3) → 1727 primes
7/6 co. eggs
n=5(1)100000, equ. (3.2/3) → 9590 primes
25/22 co. eggs

** Continue with n=5(1)1000000, check all above-mentioned **.

** Substitute in equ. (3.2,3)
the function int() [5] by the function nint() [6] or other staircase functions [7].
Does this change the output pattern?

** Extend equ. (3) catch as catch can, especially also including other mathematical constants → cadenza ad libitum and discuss the results.

** Substitute in equ. (3.2)
Φ by $\frac{\mathrm{fib}(m+1)}{\mathrm{fib}(m)}$; $m \in \mathbb{N}$, [8] (4)
see also Unit 30.1 ,
and discuss the results
Check particularly m=n.

To be continued.

References

[1] Weisstein, Eric W. "Wilson's Theorem." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/WilsonsTheorem.html
[2] https://en.wikipedia.org/wiki/Wilson%27s_theorem
[3] Weisstein, Eric W. "Golden Ratio." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/GoldenRatio.html
[4] https://en.wikipedia.org/wiki/Golden_ratio
[5] Weisstein, Eric W. "Integer Part." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/IntegerPart.html
[6] Weisstein, Eric W. "Nearest Integer Function." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/NearestIntegerFunction.html
[7] https://en.wikipedia.org/wiki/Step_function
[8] Chandra, Pravin and Weisstein, Eric W. "Fibonacci Number." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/FibonacciNumber.html

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