ERATOSTHENES - SIEVE

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1. primesUpto(6)

→ Sieve([2..6]) ... by(P)

→ Sieve((if 2>6 then §nil§ else §2|[2+1,,6]§))
... by(1S)

→ Sieve((if false then §,,§ else §,,§)) ... by(C>)

→ Sieve(2|[2+1,,6]) ... by(if2)

→ Sieve(2|[3..6]) ... by(+)

→ Sieve(2|(if 3>6 then §nil§ else §3|[3+1,,6]§))
... by(1S)

→ Sieve(2|(if false then §,,§ else §,,§)) ... by(C>)

→ Sieve(2|3|[3+1..6]) ... by(if2)

→ Sieve(2|3|[4..6]) ... by(+)

→ Sieve(2|3|(if 4>6 then §nil§ else §4|[4+1,,6]§))
... by(1S)

→ Sieve(2|3|(if false then §,,§ else §,,§)) ... by(C>)

→ Sieve(2|3|4|[4+1,,6]) ... by(if2)

→ Sieve(2|3|4|[5..6]) ... by(+)

→ Sieve(2|3|4|(if 5>6 then §nil§
else §5|[5+1,,6]§)) ... by(1S)

→ Sieve(2|3|4|5|[5+1,,6]) ... by(if2)

→ Sieve(2|3|4|5|(if 6>6 then §nil§ else §6|[6+1,,6]§)) ... by(1S)

→ Sieve(2|3|4|5|(if false then §,,§ else §,,§)) ... by(C>)

→ Sieve(2|3|4|5|6|[6+1,,6]) ... by(if2)

→ Sieve(2|3|4|5|6|[7..6]) ... by(+)

→ Sieve(2|3|4|5|6|(if 7>6 then §nil§ else §7|[7+1,,6]§)) ... by(1S)

→ Sieve(2|3|4|5|6|(if true then §,,§ else §,,§)) in by(C>)

eq primesUpto(X) = Sieve([2..X])
... P

eq Sieve(nil) = nil ... S1

eq Sieve(X|L) = X|Sieve(Check(X,L))
... S2

eq Check(0,L) = L ... C1

eq Check(N2X, nil) = nil ... C2

eq Check(N2X, Y|L) = if N2X divides Y
then §Check(N2X,L)§
else §Y|Check(N2X,L)§
... C3

eq N2X divides X = true if X is a multiple of a N2X
& false otherwise ... div

eq [X..Y] = if X>Y then §nil§
else §X|[X+1..Y]§ ... 1S

eq if true then §L§ else §L2§ = L ... if1

eq if false then §L§ else §L2§ = L2 ... if2

→ sieve(2|3|4|5|6|nil) ... by (if 1)

→ (2|sieve(check(2,(3|4|5|6|nil)))) ... by (S2)

→ (2|sieve((if(2 divides 3)then{check(2,(4|5|6|nil))}else{3|check(2,(4|5|6|nil))}))) ... by (C3)

→ (2|sieve((if false then{...}else{...}))) ... by (div)

→ (2|sieve(3|check(2,(4|5|6|nil)))) ... by (if 2)

→ (2|sieve(3|(if(2 divides 4)then{check(2,(5|6|nil))}else{4|check(2,(5|6|nil))}))) ... by (C3)

→ (2|sieve(3|(if true then{n}else{...}))) ... by (div)

→ (2|sieve(3|check(2,(5|6|nil)))) ... by (if 1)

→ (2|sieve(3|((if(2 divides 5)then{check(2,(6|nil))}else{5|check(2,(6|nil))}))) ... by (C3)

→ (2|sieve(3|(if false then{n}else{...}))) ... by (div)

→ (2|sieve(3|5|check(2,(6|nil)))) ... by (if 2)

→ (2|sieve(3|5|(if(2 divides 6)then{check(2,nil)}else{6|check(2,nil)}))) ... by (C3)

→ (2|sieve(3|5|(if true then{...}else{...}))) ... by (div)

→ (2|sieve(3|5|check(2,nil))) ... by (if 1)

→ (2|sieve(3|5|nil)) ... by (C2)

→ (2|3|sieve(check(3,(5|nil)))) ... by (S2)

→ (2|3|sieve(if(3 divides 5)then{check(3,nil)}else{5|check(3,nil)})) ... by (C3)

→ (2|3|sieve(if false then{...}else{...})) ... by (div)

→ (2|3|sieve(5|check(3,nil))) ... by (if 2)

→ (2|3|sieve(5|nil)) ... by (C2)

→ (2|3|5|sieve(check(5,nil))) ... by (S2)

→ (2|3|5|sieve(nil)) ... by (C2)

→ (2|3|5|nil) ... by (S1)

= 2|3|5|nil