Refutation of the lonely runner conjecture with three runners

Abstract: We evaluate the conjecture of the lonely runner with three runners. We do *not* assume a runner may be stationary as a no-go contestant. The result is that the conjecture diverges from tautology by one logical value and hence is refuted. We then assume a runner can be stationary with result of the same truth table also to refute the conjecture.

We assume the method and apparatus of Meth8/VŁ4 with Tautology as the designated *proof* value, **F** as contradiction, N as truthity (non-contingency), and C as falsity (contingency). The 16-valued truth table is row-major and horizontal. The 16-valued truth table is row-major and horizontal, or repeating fragments of 128-tables for more variables. (See ersatz-systems.com.)

LET p, q, r, s: runner-1, runner-2, runner-3, number of runners;
~ Not; + Or ; & And; \ Not And; > Imply; = Equivalent; @ Not Equivalent;
(p=p) tautology; (p@p) contradiction, zero 0; (%p>#p) falsity, ordinal 1.

From: en.wikipedia.org/wiki/Lonely_runner_conjecture

> **Remark 0:** Other implementations of the conjecture assume a runner may *not* run but remain stationary, and name that the lonely runner. However this initial implementation makes no such assumption because a non-runner is *not* a runner and hence removed from consideration.

No runner is stationary. (1.1.1)

(((p+q)+r)@(p@p)) = (p=p) ; **F**TTT TTTT **F**TTT TTTT (1.1.2)

No runner as equivalent to another runner implies the number of runners. (1.2.1)

((((p@q)&(q@r))&(p@r))>s) = (p=p) ; TTTT TTTT TTTT TTTT (1.2.2)

No runner is stationary, and no runner as equivalent to another runner implies the number of runners. (1.3.1)

((((p+q)+r)@(p@p))&((((p@q)&(q@r))&(p@r))>s)) = (p=p) ;
FTTT TTTT **F**TTT TTTT (1.3.2)

> **Remark 1.1/2/3:** While the truth table results for Eqs. 1.1.2 and 1.3.2 as rendered are equivalent, Eq. 1.2.2 is needed to establish that the unique runners establish the number of runners. Eqs. 1 as cast with model operators weaken the result.

A runner implies the fraction of ordinal one divided by the number of runners. (2.1.1)

(((p>((%p>#p)\s))+(q>((%p>#p)\s)))+(r>((%p>#p)\s))) = (p=p) ;
TTTT TTTT TTTT TTTC (2.1.2)

We evaluate the antecedent of Eqs. 1.3 and consequent of 2.1.

No runner is stationary, and no runner as equivalent to another runner implies the number of runners to imply a runner implies the fraction of ordinal one divided by the number of runners. (3.1.1)

((((p+q)+r)@(p@p))&((((p@q)&(q@r))&(p@r))>s)) >
(((p>((%p>#p)\s))+(q>((%p>#p)\s)))+(r>((%p>#p)\s))) ;
`TTTT TTTT TTTT TTTC` (3.1.2)

Remark 3: Eq. 2.1 and 3.1 produce the same truth table result as *close* to tautology but divergent by one `C` contingency, falsity value. This is due to `T>C=C`.

If we ignore Eq. 1.1 to establish that a runner can be permitted as stationary, to adopt the common assumption, the truth table result analog for Eq. 3 becomes:

((((p@q)&(q@r))&(p@r))>s) >
(((p>((%p>#p)\s))+(q>((%p>#p)\s)))+(r>((%p>#p)\s))) ;
`TTTT TTTT TTTT TTTC` (4.1.2)

Remark 4: By admitting a stationary runner, the conjecture results in the same truth table as Eq. 3.1.2.

Excepting Eq. 1.2, the other Eqs. are *not* tautologous. This means that with or without assuming a runner can be stationary as a no-go, the lonely runner conjecture is refuted.