
MODULE *appex2_3*

prime numbers

EXTENDS *Naturals, TLC, Integers*

CONSTANTS $x0, max, u$

$min \triangleq -max$

VARIABLES x, y, z, pc

$D \triangleq min .. max$

$rte(X) \triangleq X \neq u \Rightarrow X \in D$

Précondition

ASSUME $x0 \in D \wedge x0 \geq 2$

définitions

$diviseurs(X) \triangleq \{ m \in 1 .. X : X \% m = 0 \}$

$prime(X) \triangleq (diviseurs(X) = \{1, X\}) \wedge X \neq 1$

$Locs \triangleq \{ \text{"START"}, \text{"HALT"}, \text{"POINT"} \}$

$start \triangleq pc = \text{"START"} \wedge y' = 2 \wedge pc' = \text{"POINT"} \wedge \text{UNCHANGED } \langle x, z \rangle$

$case1 \triangleq$

$\wedge pc = \text{"POINT"} \wedge y \geq x$

$\wedge z' = \text{TRUE}$

$\wedge pc' = \text{"HALT"}$

$\wedge PrintT(y)$

$\wedge \text{UNCHANGED } \langle x, y \rangle$

$case21 \triangleq$

$\wedge pc = \text{"POINT"} \wedge y < x \wedge (x \% y = 0)$

$\wedge pc' = \text{"HALT"}$

$\wedge z' = \text{FALSE}$

$\wedge \text{UNCHANGED } \langle x, y \rangle$

$case22 \triangleq$

$\wedge pc = \text{"POINT"} \wedge y < x \wedge (x \% y \neq 0)$

$\wedge y' = y + 1$

$\wedge \text{UNCHANGED } \langle x, z, pc \rangle$

$eprint \triangleq$

$\wedge pc = \text{"HALT"}$

$\wedge PrintT(z)$

$\wedge PrintT(x)$

$\wedge \text{UNCHANGED } \langle x, y, z, pc \rangle$

$Next \triangleq$

$\vee start \vee case1 \vee case21 \vee case22$

$$\vee \text{ UNCHANGED } \langle x, y, z, pc \rangle \vee eprint$$

$$Init \triangleq x = x0 \wedge y = u \wedge z = u \wedge pc = \text{"START"}$$

$$\begin{aligned} Q1 &\triangleq pc \neq \text{"HALT"} \quad pc \text{ print la valeur } HALT \\ Q2 &\triangleq pc = \text{"HALT"} \Rightarrow (x = x0) \wedge (z \equiv (diviseurs(x) = \{1, x\} \wedge x \neq 1)) \\ Q3 &\triangleq pc = \text{"HALT"} \Rightarrow (x = x0) \wedge (z = prime(x)) \\ Q4 &\triangleq pc \in Locs \\ Q5 &\triangleq rte(x) \wedge rte(y) \\ Q &\triangleq Q2 \wedge Q3 \wedge Q4 \wedge Q5 \end{aligned}$$