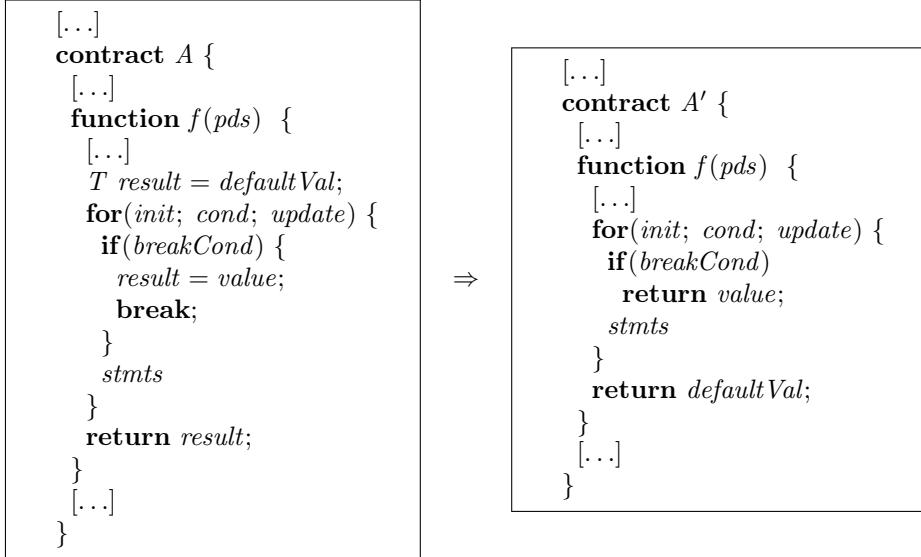

Rule 0.31 *(Redundant Control Flow Removal (Break to Early Return))*



where

breakCond is a boolean condition that triggers early loop termination;
T is the return type of function *f*;
result is a local variable of type *T* used to store the return value;
value is the expression assigned to *result* when *breakCond* is true;
defaultVal is the default return value when the loop completes normally;
init, *cond*, and *update* are the loop initialization, condition, and update expressions;
stmts represents the remaining statements in the loop body;
is is the return type declaration.

provided

The only purpose of *result* is to store a value for return after the loop;
result is not read or modified elsewhere in the function after the loop;
The **break** statement is immediately executed after assigning to *result*;
No cleanup or finalization code exists between the loop and the return statement;
breakCond, *value*, and *defaultVal* have no side effects that affect program state.

Invariant:

Let s_i and s'_i be the initial state of *A* and *A'*, respectively.

Let s_f and s'_f be the state reached by *A* and *A'*, respectively, after *A.f()* and *A'.f()* are executed from s_i and s'_i , respectively.

Then, the coupling invariant is

$$\forall s_i, s'_i . (s_i = s'_i) \rightarrow (s_f = s'_f)$$
