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ERRATUM

A more precise rounding algorithm for rational numbers

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The purpose of this note is to correct a mistake in the article [1]. An error crept into algorithm 4, the more precise rounding. The algorithm does not work for inputs <1, in that it then always gives the result $1/0$. The error consists in the extra condition "$X_1 \geq X$ **and**" in the test following the comment "{now look ahead:}". This extra condition is to be deleted. The correct algorithm goes as follows:

input $t = r/s$
$X_1 := r$, $X := s$
$P_1 := 0$, $Q_1 := 1$, $P := 1$, $Q := 0$
NoOverflowSoFar := **true**
while $X > 0$ **do**
  $K := 0$
  while *NoOverflowSoFar* **and** (X_1, X) is not aligned for division **do**
    if $2 \cdot P \,/\, 2 \cdot Q \in S$ **then**
      $P := 2 \cdot P$, $Q := 2 \cdot Q$, $X := 2 \cdot X$, $K := K + 1$
    else
      NoOverflowSoFar := **false**
    end if
  end while

The online version of the original article can be found under doi:10.1007/s00607-008-0006-7.

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```
{now look ahead:}
if NoOverflowSoFar and P1 + P / Q1 + Q ∈ S then
  repeat
    if X1 ≥ X then
      NoOverflowSoFar := (P1 + P / Q1 + Q ∈ S)
      {please note above the difference to algorithm 3}
      if NoOverflowSoFar then
        P1 := P1 + P, Q1 := Q1 + Q, X1 := X1 − X
      end if
    end if
    if K > 0 then
      X1 := 2 · X1, P := P / 2, Q := Q / 2
    end if
    K := K − 1
  until K < 0
else
  {recover convergent:}
  while K > 0 do
    P := P / 2, Q := Q / 2, K := K − 1
  end while
  X := 0 {to exit "while"}
end if
interchange (X, X1), interchange (P, P1), interchange (Q, Q1)
end while
Result := P/Q, Preceding Convergent := P1/Q1
return Result, Preceding Convergent
```

Reference

1. Thill M (2008) A more precise rounding algorithm for natural numbers. Computing 82(2–3):189–198