ALGORITHM 99
EVALUATION OF JACOBI SYMBOL

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```
procedure Jacobi (n,m,r); value n,m;
integer n, m, r;
comment Jacobi computes the value of the Jacobi symbol (n/m),
  where m is odd, by the law of quadratic reciprocity. The param-
  eter r is assigned one of the values −1, 0, or 1 if m is odd. If m
  is even, the symbol is undefined and r is assigned the value 2.
  For odd m the routine provides a test of whether m and n are
  relatively prime. The value of r is 0 if and only if m and n have
  a nontrivial common factor. In the special case where m is prime,
  r = −1 if and only if n is a quadratic nonresidue of m;
begin
  integer s;
  Boolean p, q;
  Boolean procedure parity (x); value x; integer x;
    comment The value of the function parity is true if x is
      odd, false if x is even;
    begin
      parity := x ÷ 2 × 2 ≠ x
    end parity;
  if ¬ parity (m) then begin r := 2; go to exit end;
  p := true;
  loop: n := n − n ÷ m × m;
        q := false;
        if n ≦ 1 then go to done;
  even: if ¬ parity (n) then
        begin
          q := ¬ q;
          n := n ÷ 2;
          go to even
        end n now odd;
        if q then if parity ((m↑2 − 1)÷8) then p := ¬ p;
        if n = 1 then go to done;
        if parity ((m−1) × (n−1) ÷ 4) then p := ¬ p;
        s := m; m := n; n := s; go to loop;
  done: r := if n = 0 then 0 else if p then 1 else −1;
exit: end Jacobi
```

REMARK ON ALGORITHM 99
EVALUATION OF JACOBI SYMBOL [S. J. Garland and A. W. Knapp, *Comm. ACM 6*, June 1962]

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One syntactical error was found in this procedure. It occurs in the second **if** statement following the **label** even. The statement

```
if q then if parity ((m↑2−1)÷8) then
    p := ¬ p;
```

might be changed as follows.

```
        if q then go to CHECK;
next 1: if n = 1 then go to done;
CHECK:  if parity ((m ↑ 2 − 1) ÷ 8) then
          p := ¬ p;
        go to next 1;
```

The two statements beginning with *CHEC*K could be inserted before the **label** done and after the statement **go to** loop;.