ALGORITHM 98
EVALUATION OF DEFINITE COMPLEX LINE INTEGRALS

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procedure COMPLINEINTEGRAL(A, B, N, RSSUM);
value A, B, N; real A, B, N; array RSSUM;
comment COMPLINEINTEGRAL approximates the complex line integral by evaluating the partial Riemann-Stieltjes sum \( \sum_{z_{i-1}}^{z_i} f(z(t)) z_i - z_{i-1} \) where \( a \leq t \leq b \) and \( z_i \in (z_{i-1}, z_i) \). The programmer must provide 1) the procedures GAMMA(T, Z) to calculate \( z(t) \) on \( T \), and FUNCT(Z, F) to calculate function values, and 2) the end points \( A \) and \( B \) of the parametric interval and \( N \) the number of subintervals into which \( [a, b] \) is to be partitioned;

begin integer I; real T, DELT; real array ZT, ZTL, DELZ, ZK, PART[1..2]; RSSUM[1] := 0.0; RSSUM[2] := 0.0;
DELT := (B - A)/N; T := A;
line: GAMMA(T, ZT);
if T = A then go to next;
for I := 1 step 1 until 2 do
begin
DELT[I] := ZT[I] - ZTL[I]; end;
for I := 1 step 1 until 2 do
begin
ZK[I] := ZTL[I] + DELZ[I]/2.0; end;
FUNCT(ZK, FZ);
for I := 1 step 1 until 2 do
begin
RSSUM[I] := RSSUM[I] + PART[I]; end;
if T < B - (0.25 × DELT) then go to next else go to exit;
next:
for I := 1 step 1 until 2 do
begin
ZTL[I] := ZT[I]; end;
T := T + DELT;
go to line;
exit: end COMPLINEINTEGRAL.