Numerical Analysis

MATLAB Assignment 2 Pseudocode

Kenny Roffo, Nicholas Jira

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Romberg($f, a, b, tol, max, success$):

$r = [,]$
$count = 0$
$r[1,1] = (b-a) * (f(a) + f(b))/2$
$r[0,0] = r[1,1] + 2 * tol$
$success = \text{abs}(r[count][count] - r[count+1][count+1] \leq tol)$
while($count \leq max$ and not $success$:
  $count = count + 1$
  $h = (b-a)/2\hat{}(count-1)$
  $fsum = 0$
  for $i = 1$ to $2\hat{}(count-1)$:
    $fsum = fsum + a + (2i-1) * h$
  $r[count+1][1] = r[count][1]/2 + h * fsum$
  for $k = 2$ to $count + 1$:
    $r[count+1][k] = (4\hat{}(k-1) * r[count+1][k-1] - r[count][k-1])/(4\hat{}(k-1) - 1)$
  $success = \text{abs}(r[count][count] - r[count+1][count+1] \leq tol)$
return $r[count+1][count+1]$, $success$