

Numerical Analysis

MATLAB Assignment 2 Pseudocode

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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  $success$ ):  
     $count = count + 1$   
     $h = (b - a) / 2^{(count - 1)}$   
     $fsum = 0$   
    for  $i = 1$  to  $2^{(count - 1)}$ :  
         $fsum = fsum + f(a + (2i - 1) * h)$   
     $r[count + 1][1] = r[count][1] / 2 + h * fsum$   
    for  $k = 2$  to  $count + 1$ :  
         $r[count + 1][k] = (4^{(k - 1)} * r[count + 1][k - 1] - r[count][k - 1]) / (4^{(k - 1)} - 1)$   
     $success = \text{abs}(r[count][count] - r[count + 1][count + 1]) \leq tol$   
return  $r[count + 1][count + 1], success$ 
```