Bisection method.

Assignment by hand.: $a=1,\ b=2$

$\frac{2\sin(\theta)}{3\theta} - \frac{1}{2} = 0 \rightsquigarrow \frac{2\cdot\sin\theta}{3\theta} - \frac{1}{2} = 0$

$i=1 \quad a=1 \quad b=2, \quad f(1) = \frac{2\sin(1)}{3\cdot 1} - \frac{1}{2} = 0,060931$

$tol = \left|\frac{b-a}{2}\right| = 0,5 \qquad f(2) = \frac{2\sin(2)}{3\cdot 2} - \frac{1}{2} = -0,196901$

$x_{NS1} = \frac{1+2}{2} = 1,5 \qquad f(1,5) = \frac{2\cdot\sin(1,5)}{3\cdot 1,5} - \frac{1}{2} = -0,056669$

$i=2 \quad a=1 \quad b=1,5 \quad x_{NS2} = \frac{1+1,5}{2} = 1,25 \quad f(1,25) = 0,00612513$

$ERE = \left|\frac{x_{NS2} - x_{NS1}}{x_{NS1}}\right| = \frac{|1,25-1,5|}{1,5} = 0,167$

$tol = \left|\frac{1,5-1}{2}\right| = 0,25$

[Estimated relative Error

$i=3 \quad a=1,25 \quad b=1,5 \quad x_{NS3} = \frac{1,25+1,5}{2} = 1,375 \quad f(1,375) = -0,0244155$

$ERE = \frac{|1,375-1,25|}{1,25} = 0,1 \qquad tol = \frac{|1,5-1,25|}{2} = 0,125$

$i=4 \quad a=1,25 \quad b=1,375 \quad x_{NS4} = \frac{1,25+1,375}{2} = 1,3125 \quad f(1,3125) = -0,00891349$

$ERE = \frac{|1,3125-1,375|}{1,375} = 0,04545 \qquad tol = \frac{|1,375-1,25|}{2} = 0,0625$

$i=5 \quad a=1,25 \quad b=1,3125 \quad x_{NS5} = \frac{1,3125+1,25}{2} = 1,28125 \quad f(1,28125) = -0,00133411$

$ERE = \frac{|1,28125-1,3125|}{1,3125} = 0,0238095 \qquad tol = \frac{|1,3125-1,25|}{2} = 0,03125$

$i=6 \quad a=1,25 \quad b=1,28125 \quad x_{NS6} = \frac{1,25+1,28125}{2} = 1,265625 \quad f(1,265625) = 0,00241079$

$ERE = \frac{|1,265625-1,28125|}{1,28125} = 0,012195 \qquad tol = \frac{|1,28125-1,25|}{2} = 0,015625$

$i=7 \quad a=1,265625 \quad b=1,28125 \quad x_{NS7} = \frac{1,265625+1,28125}{2} = 1,2734375$

$f(1,2734375) = 0,000542128$

$ERE = \frac{|1,2734375-1,265625|}{1,265625} = 0,00617289 \qquad tol = \frac{|1,28125-1,265625|}{2} = 0,0078125$

$i=8$ $a=1,2734375$ $b=1,28125$ $xN8=\frac{1,2734375+1,28125}{2}=$

$f(1,2773437 5)=-0,0003950480 9$ $1,27734375$

$ERE=\frac{|1,27734375-1,2734375|}{1,2734375}=0,0030674 8$ $tol=\frac{|1,28125-1,27}{2}$

$=0,0030962 5$

$i=9$ $a=1,2734375$ $b=1,27734375$ $xN9=\frac{|1,2734375+1,27734375|}{2}=$

$f(1,2753906 25)=0,0000737766926 8$ $1,2753906 25$

$ERE=\frac{|1,2753906 25-1,27734375|}{1,27734375}=0,0015290519 88$

$tol=\frac{|1,27734375-1,2734375|}{2}=0,0019531 25$

for $\varepsilon=2tol$

$\Delta x=2-1=1$ $M=\frac{\ln(\Delta x)-\ln(\varepsilon)}{\ln(2)}=8,002 \rightsquigarrow 9$ iterations

initial interval