Applied Computational Methods in Mechanical Sciences

(ME466)

Test 1

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**Python Code:**

import time

import math

#globals

g = 9.81

Q = 20

def fun(g\_,Q\_,y):

a = g\_\*pow(y,3)

b = pow ((6+y),3)

c = (3+y)\*Q\_\*Q\_

fun\_val = ((a\*b)/8)-c

return(fun\_val)

def bisect\_root(guess,g,Q):

a= guess[0]

b= guess[1]

itr = 0

print("\t","y","\t\t","f(y)","\t\t\t\t","relative\_error")

while(1):

f\_a = fun(g,Q,a)

f\_b = fun(g,Q,b)

m = (a+b)/2

f\_m = fun(g,Q,m)

if(f\_a\*f\_m > 0): #same signs so they should replace

a = m

elif(f\_b\*f\_m > 0 ):

b = m

else:

print("\n Problem with elif")

err = 0

if(itr):

#erroe

err = (m - m\_prev)/m

if(err<0):

err=-1\*err

#print("\n Error is :",err)

if(err<0.001):

print("\nProcess over with error limit : 0.001")

break

print("\t",m,"\t\t",f\_m,"\t\t",err)

m\_prev=m

itr = itr +1

print("Solution is:", m )

print("Error is:",err)

print("Number of iterations",itr)

print ("\n CPU time: ", time.process\_time(),'s')

bisect\_root((0.5,2.5),g,Q)

**Results:**

y f(y) relative\_error

1.5 -54.03076171875 0

2.0 3022.7200000000003 0.25

1.75 1159.1324014282231 0.14285714285714285

1.625 482.6987701272965 0.07692307692307693

1.5625 198.18343915976584 0.04

1.53125 68.19564233830761 0.02040816326530612

1.515625 6.131449771065263 0.010309278350515464

1.5078125 -24.185032517226546 0.0051813471502590676

1.51171875 -9.085930702429778 0.002583979328165375

1.513671875 -1.4920623014088505 0.0012903225806451613

Process over with error limit : 0.001

Solution is: 1.5146484375

Error is: 0.0006447453255963894

Number of iterations 10

CPU time: 0.078125 s

[Finished in 0.308s]