RUNGE-KUTTA 2ND ORDER METHOD

PROGRAM 1

c rk.for

real k1,k2

f(x,y)=(y-x)/(y+x)

open(unit=1,file="rk.in")

open(unit=2,file="rk.out")

read(1,\*)x,y,a,b,h,n

write(2,\*)"f(x,y)=(y-x)/(y+x)"

write(2,\*)" "

write(2,\*)"x=",x

write(2,\*)"y=",y

write(2,\*)"a=",a

write(2,\*)"b=",b

write(2,\*)"h=",h

write(2,\*)"n=",n

write(2,\*)" "

write(2,\*)" "

yy=y

write(2,\*)"Answer"

write(2,\*)" "

do 100 i=1,n

k1=h\*f(x,yy)

k2=h\*f(x+h,yy+k1)

write(2,\*)"k1=",k1," k2=",k2

x=x+h

yy=yy+(k1+k2)/2

write(2,\*)"x=",x," y=",yy

write(2,\*)" "

100 continue

stop

end

INPUT FILE

0

1

0

1

0.2

5

OUTPUT FILE

f(x,y)=(y-x)/(y+x)

x= 0.00000000

y= 1.00000000

a= 0.00000000

b= 1.00000000

h= 0.200000003

n= 5

Answer

k1= 0.200000003 k2= 0.142857149

x= 0.200000003 y= 1.17142856

k1= 0.141666666 k2= 0.106601804

x= 0.400000006 y= 1.29556274

k1= 0.105636053 k2= 8.00718814E-02

x= 0.600000024 y= 1.38841677

k1= 7.93009549E-02 k2= 5.88889606E-02

x= 0.800000012 y= 1.45751178

k1= 5.82510158E-02 k2= 4.10024971E-02

x= 1.00000000 y= 1.50713849

PROGRAM 2

c rke1.for

real k1,k2

f(x,y)=(x\*x+y\*y)/10

open(unit=1,file='rke1.in')

open(unit=2,file='rke1.out')

read(1,\*)x,y,a,b,h,n

write(2,\*)"f(x,y)=(x\*x+y\*y)/10"

write(2,\*)" "

write(2,\*)"x=",x

write(2,\*)"y=",y

write(2,\*)"a=",a

write(2,\*)"b=",b

write(2,\*)"h=",h

write(2,\*)"n=",n

write(2,\*)" "

yy=y

write(2,\*)"Answer"

write(2,\*)" "

do 100 i=1,n

k1=h\*f(x,yy)

k2=h\*f(x+h,yy+k1)

write(2,\*)"k1=",k1," k2=",k2

x=x+h

yy=yy+(k1+k2)/2

write(2,\*)"x=",x," y=",yy

write(2,\*)" "

100 continue

stop

end

INPUT FILE

0

1

0

0.4

0.1

4

OUTPUT FILE

f(x,y)=(x\*x+y\*y)/10

x= 0.00000000

y= 1.00000000

a= 0.00000000

b= 0.400000006

h= 0.100000001

n= 4

Answer

k1= 9.99999978E-03 k2= 1.03010004E-02

x= 0.100000001 y= 1.01015055

k1= 1.03040412E-02 k2= 1.08132763E-02

x= 0.200000003 y= 1.02070916

k1= 1.08184721E-02 k2= 1.15404930E-02

x= 0.300000012 y= 1.03188860

k1= 1.15479408E-02 k2= 1.24875987E-02

x= 0.400000006 y= 1.04390633