## **simpson\_1\_3\_rule.py**

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# Name: simpson\_1\_3\_rule

# Purpose: compute definite integral

#

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# Created:

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#-------------------------------------------------------------------------------

def simpson\_1\_3\_rule(f, a, b, n):

"""

Calculates the definite integral of a function f using Simpson's 1/3rd rule.

Arguments:

f -- the function to integrate

a -- the lower limit of integration

b -- the upper limit of integration

n -- the number of intervals to use

Returns:

The value of the definite integral of f from a to b using Simpson's 1/3rd rule.

"""

if n % 2 != 0:

raise ValueError("n must be an even integer")

h = (b - a) / n

x = [a + i \* h for i in range(n+1)]

integral = f(x[0])

for i in range(1, n):

if i % 2 == 0:

integral += 2 \* f(x[i])

else:

integral += 4 \* f(x[i])

integral += f(x[-1])

integral \*= h / 3

return integral

def f(x):

return eval(fun(x))

y = input("Enter function : ")

fun = lambda x : eval(y)

a = float(input("Enter the lower limite a : "))

b = float(input("Enter the upper limite b : "))

n = int(input("Enter the number of intervals to use :"))

integral = simpson\_1\_3\_rule(fun, a, b, n)

print("The value of the definite integral of f from a to b using Simpson's 1/3rd rule = "+ str(integral))

Output :-

Enter function : 1/(x\*\*2+6\*x+10)

Enter the lower limite a : 0

Enter the upper limite b : 1

Enter the number of intervals to use :4

The value of the definite integral of f from a to b using Simpson's 1/3rd rule = 0.07677275312993578