SIMPSON 1/3 RULE IMPLEMENATION IN PYTHON

SUBMITTED BY: UMANG KANCHAN

SUBMITTED TO: Dr. AYESHA CHOUDHARY

ASSIGNMENT 8B

NUMERICAL METHODS (CS-406)

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def simpsons\_rule(*f*, *a*, *b*, *n*):

    h = (b - a) / n

    sum\_1 = 0

    sum\_2 = 0

    for i in range(1, n):

        x\_i = a + i\*h

        if i % 2 == 0:

            sum\_2 = sum\_2 + f(x\_i)

        else:

            sum\_1 = sum\_1 + f(x\_i)

    integral = (h / 3) \* (f(a) + 4\*sum\_1 + 2\*sum\_2 + f(b))

    return integral

# user input

f\_string = input("Enter the integrand function: ")

f = lambda *x*: eval(f\_string)

a = *float*(input("Enter the lower limit of integration: "))

b = *float*(input("Enter the upper limit of integration: "))

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

# test

integral = simpsons\_rule(f, a, b, n)

print(f"The approximate value of the integral is {integral}")

TEST CASE :

Enter the integrand function: 1/(1+x)

Enter the lower limit of integration: 0

Enter the upper limit of integration: 1

Enter the number of intervals: 6

The approximate value of the integral is 0.6931697931697932