

PATUAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY

COURSE CODE CCE 312
Numerical Methods Sessional

SUBMITTED TO:

Prof. Dr. Md Samsuzzaman

Department of Computer and Communication Engineering
Faculty of Computer Science and Engineering

SUBMITTED BY:

Md. Sharafat Karim

ID: 2102024,

Registration No: 10151

Faculty of Computer Science and Engineering

Assignment 08

Assignment title: Trapezoidal Rule

Date of submission: 24 Sun, Aug 2025



Integrals

Sharafat Karim

Let's approximate the integral of a function using numerical methods.

Trapezoidal Rule

At first our necessary libs,

```
import numpy as np
import matplotlib.pyplot as plt
```

Let's define a sample function to integrate.

```
def fun(x):
    return 0.2 + 25 * x - 200 * x**2 + 675 * x**3 - 900 * x**4 + 400 * x**5
```

Let's plot it!

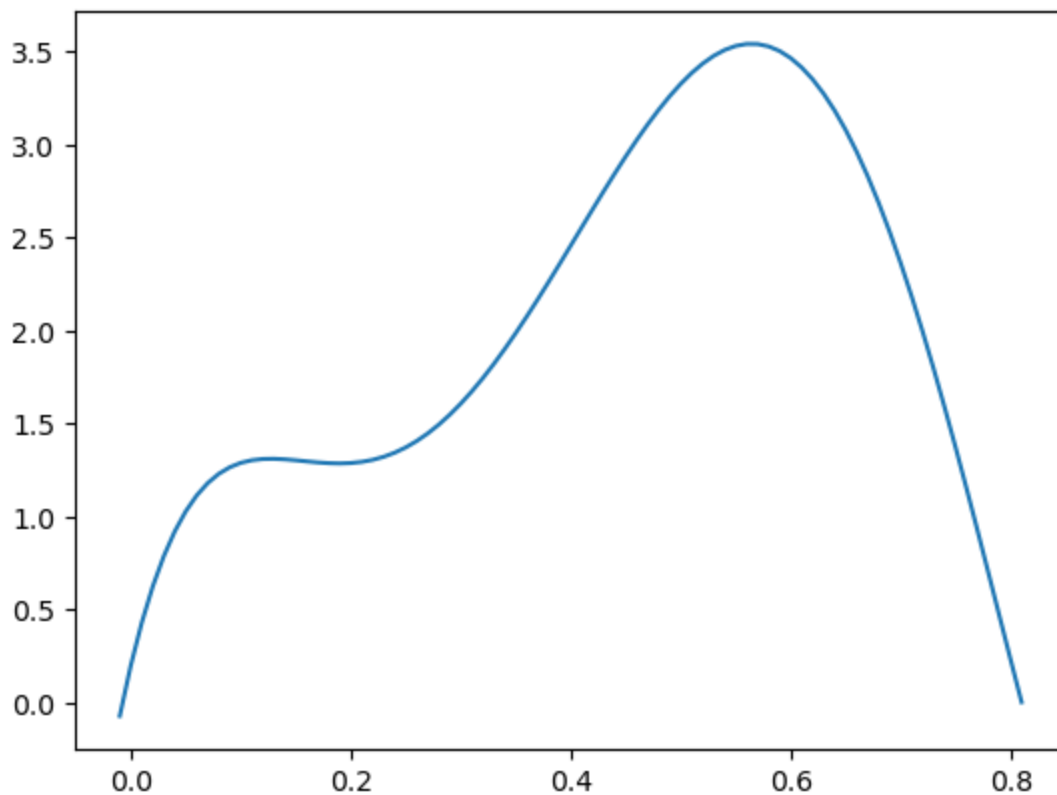
```
array = np.arange(-0.01, 0.82, 0.01)
print(fun(array))
plt.plot(array, fun(array))
```

```
[-0.07068404  0.2          0.43066604  0.62525728  0.78750572  0.92093696
  1.0288875    1.11444704  1.18058828  1.23004672  1.26538796  1.289
```

```

1.30309804 1.30972928 1.31077772 1.30796896 1.302875 1.29691904
1.29138028 1.28739872 1.28597996 1.288 1.29421004 1.30524128
1.32160972 1.34372096 1.371875 1.40627104 1.44701228 1.49411072
1.54749196 1.607 1.67240204 1.74339328 1.81960172 1.90059296
1.985875 2.07490304 2.16708428 2.26178272 2.35832396 2.456
2.55407404 2.65178528 2.74835372 2.84298496 2.934875 3.02321504
3.10719628 3.18601472 3.25887596 3.325 3.38362604 3.43401728
3.47546572 3.50729696 3.528875 3.53960704 3.53894828 3.52640672
3.50154796 3.464 3.41345804 3.34968928 3.27253772 3.18192896
3.077875 2.96047904 2.82994028 2.68655872 2.53073996 2.363
2.18397004 1.99440128 1.79516972 1.58728096 1.371875 1.15023104
0.92377228 0.69407072 0.46285196 0.232 0.00356204]

```



Let's define our Trapezoidal Rule!

```

def trapezoidal_rule(fun, a, b):
    return (b - a) * (fun(a) + fun(b)) / 2

```

Our trapezoidal rule function is ready to use!

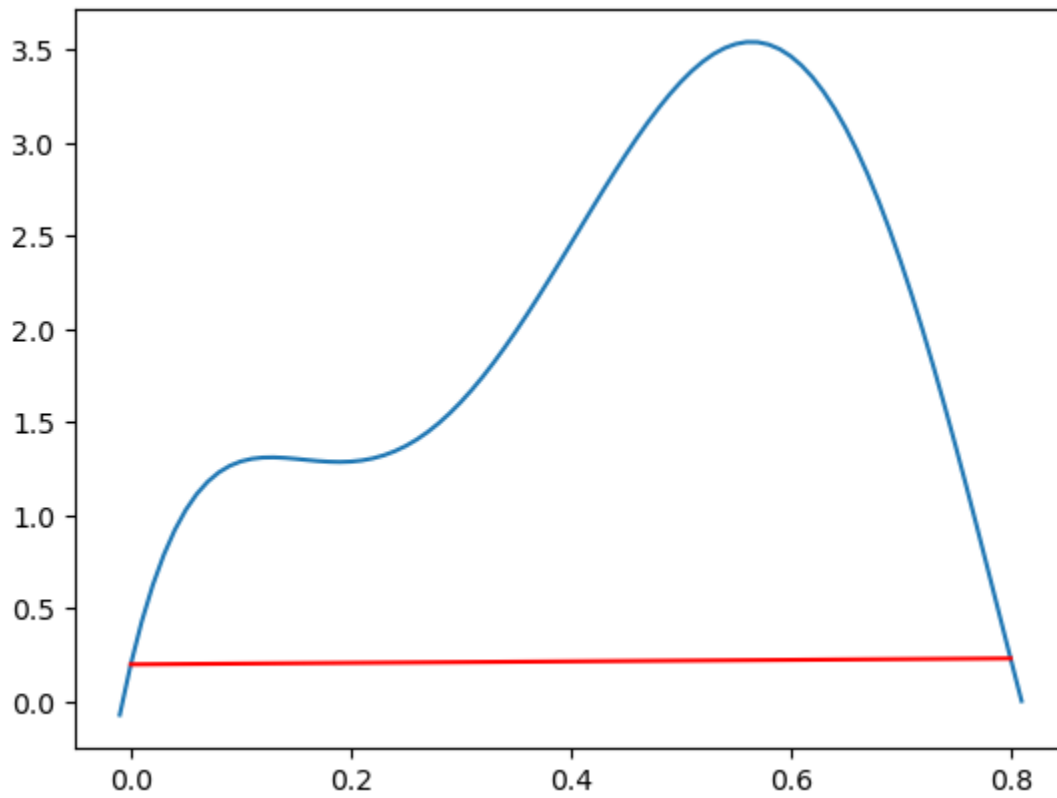
```

print(trapezoidal_rule(fun, 0, 0.8))

```

```
plt.plot(array, fun(array))  
plt.plot([0, 0.8], [fun(0), fun(0.8)], color='red')
```

0.17280000000000225



Numerical Methods
Polynomial Regression

Data Analysis
Data Analysis

