PRACTICAL-11
Trapezoidal Method

Prachi Mittal{20211061}

Ques-1

In[46]:=
```
a = Input["Enter the left end point:"];
b = Input["Enter the right end point:"];
n = Input["Enter the number od sub intervals to be formed:"];
h = (b - a) / n;
y = Table[a + i * h, {i, 1, n}];
f[x] := Log[x];
sumodd = 0;
sumeven = 0;
For[i = 1, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
For[i = 2, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
Tn = (h / 2) * ((f[x] /. x → a) + N[sumodd] + N[sumeven] + (f[x] /. x → b));
Print["For n=", n, ",Trapezoidal estimate is: ", Tn]
in = Integrate[Log[x], {x, 4, 5.2}];
Print["True value is ", in]
Print["Absolute error is ", Abs[Tn - in]]
```

For n=6,Trapezoidal estimate is: 1.82766

True value is 1.82785

Absolute error is 0.00019227

Ques-2

```
In[61]:= a = Input["Enter the left end point:"];
         b = Input["Enter the right end point:"];
         n = Input["Enter the number od sub intervals to be formed:"];
         h = (b - a) / n;
         y = Table[a + i * h, {i, 1, n}];
         f[x] := Sin[x];
         sumodd = 0;
         sumeven = 0;
         For[i = 1, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
         For[i = 2, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
         Tn = (h / 2) * ((f[x] /. x → a) + N[sumodd] + N[sumeven] + (f[x] /. x → b));
         Print["For n=", n, ",Trapezoidal estimate is: ", Tn]
         in = Integrate[Sin[x], {x, 0, Pi / 2}];
         Print["True value is ", in]
         Print["Absolute error is ", Abs[Tn - in]]

         For n=12,Trapezoidal estimate is: 0.998572

         True value is 1

         Absolute error is 0.0014283
```

Ques-3

```
In[91]:= a = Input["Enter the left end point:"];
         b = Input["Enter the right end point:"];
         n = Input["Enter the number od sub intervals to be formed:"];
         h = (b - a) / n;
         y = Table[a + i * h, {i, 1, n}];
         f[x] := Sin[x] - Log[x] + Exp[x];
         sumodd = 0;
         sumeven = 0;
         For[i = 1, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
         For[i = 2, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
         Tn = (h / 2) * ((f[x] /. x → a) + N[sumodd] + N[sumeven] + (f[x] /. x → b));
         Print["For n=", n, ",Trapezoidal estimate is: ", Tn]
         in = Integrate[Sin[x] - Log[x] + Exp[x], {x, 0.2, 1.4}];
         Print["True value is ", in]
         Print["Absolute error is ", Abs[Tn - in]]

         For n=12,Trapezoidal estimate is: 4.05617

         True value is 4.05095

         Absolute error is 0.00522484
```

Ques-4

```
In[106]:= a = Input["Enter the left end point:"];
          b = Input["Enter the right end point:"];
          n = Input["Enter the number od sub intervals to be formed:"];
          h = (b - a) / n;
          y = Table[a + i * h, {i, 1, n}];
          f[x] := 1 / (1 + x^2);
          sumodd = 0;
          sumeven = 0;
          For[i = 1, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
          For[i = 2, i < n, i += 2, sumodd += 2 * f[x] /. x → y[[i]]];
          Tn = (h / 2) * ((f[x] /. x → a) + N[sumodd] + N[sumeven] + (f[x] /. x → b));
          Print["For n=", n, ",Trapezoidal estimate is: ", Tn]
          in = Integrate[1 / (1 + x^2), {x, 0, 1}];
          Print["True value is ", in]
          Print["Absolute error is ", Abs[Tn - in]]
```

For n=6,Trapezoidal estimate is: 0.784241

True value is $\frac{\pi}{4}$

Absolute error is 0.0011574