In[98]:=
```
(**Problem 3**)
Remove["Global`*"]

f[x_] := 1/(1 + x);

exact = Integrate[f[x], {x, 0, 1}] // N;

Print["The exact value of the integral is ", exact]
Print["\n"]

TrapRule[a0_, b0_, m0_] :=
      Module[{a = N[a0], b = N[b0], m = m0, k},

       h = (b - a)/m;

       sum = 0;

       For[k = 1, k ≤ m - 1, k++,
        sum = sum + f[a + h k];];

       Return[(h/2) (f[a] + f[b]) + h sum];];

For[n = 10, n ≤ 80, n = 2 n,
 approx = TrapRule[0, 1, n];
 err = Abs[approx - exact];
 Print["n = ", n]
  Print["Approximate Value = ", approx]
  Print["Absolute Error = ", err]
  Print["Absolute Error X n^2 = ", err * n^2]
  Print["\n"]
]
```

The exact value of the integral is 0.693147

n = 10

Approximate Value = 0.693771

Absolute Error = 0.000624223

Absolute Error X n^2 = 0.0624223

n = 20

Approximate Value = 0.693303

Absolute Error = 0.000156201

Absolute Error X n^2 = 0.0624805

n = 40

Approximate Value = 0.693186

Absolute Error = 0.0000390594

Absolute Error X n^2 = 0.0624951

n = 80

Approximate Value = 0.693157

Absolute Error = 9.76543×10^{-6}

Absolute Error X n^2 = 0.0624988

In[93]:=
```
(**Problem 4**)
Remove["Global`*"]

f[x_] := 1/(1 + x);

exact = Integrate[f[x], {x, 0, 1}] // N;

Simpson[a0_, b0_, m0_] :=
      Module[{a = N[a0], b = N[b0], m = m0, k},

       h = (b - a)/(2 m);

       SumEven = 0;
       For[k = 1, k ≤ m - 1, k++,
        SumEven = SumEven + f[a + h 2 k];];

       SumOdd = 0;
       For[k = 1, k ≤ m, k++,
        SumOdd = SumOdd + f[a + h (2 k - 1)];];

       Return[h/3 (f[a] + f[b] + 2 SumEven + 4 SumOdd)];];

For[n = 10, n ≤ 80, n = 2 n,
 approx = Simpson[0, 1, n];
 err = Abs[approx - exact];
 Print["n = ", n]
  Print["Approximate Value = ", approx]
  Print["Absolute Error = ", err]
  Print["Absolute Error X n^4 = ", err * n^4]
  Print["\n"]
]
```

n = 10

Approximate Value = 0.693147

Absolute Error = 1.94105×10^{-7}

Absolute Error X n^4 = 0.00194105

n = 20

Approximate Value = 0.693147

Absolute Error = 1.2188×10^{-8}

Absolute Error X n^4 = 0.00195008

n = 40

Approximate Value = 0.693147

Absolute Error = 7.62642×10^{-10}

Absolute Error X n^4 = 0.00195236

n = 80

Approximate Value = 0.693147

Absolute Error = 4.76791×10^{-11}

Absolute Error X n^4 = 0.00195294