

Module1 - 1

```
Function f(X As Double) As Double
    f = X / (1 + X * X) ^ 5
End Function
```

```
Function fText() As String
    fText = "X / (1 + X * X) ^ 5"
End Function
```

Module2 - 1

Function Trapez(XBawah As Double, XAtas As Double, n As Integer) As Double

```
' Pesan tempat
  Dim i As Integer, h As Double, Sum As Double

' Hitung h, increment
  h = (XAtas - XBawah) / n

' Inisialisasi
  Sum = (f(XBawah) + f(XAtas)) / 2

' Hitung tiap pias
  For i = 1 To n - 1
    Sum = Sum + f(XBawah + i * h)
  Next i

' Masukkan hasilnya kedalam fungsi
  Trapez = Sum * h
```

End Function

Function Simpson(XBawah As Double, XAtas As Double, n As Integer) As Double

```
' Pesan tempat
  Dim i As Integer, nGenap As Integer, h As Double, Sum, X As Double

' Paksa n harus genap
  nGenap = Int(n / 2) * 2

' Hitung h, increment
  h = (XAtas - XBawah) / n

' Inisialisasi
  Sum = 0#

' Hitung tiap pias
  For i = 1 To n / 2
    X = XBawah + (2 * i - 2) * h
    Sum = Sum + f(X) + 4 * f(X + h) + f(X + 2 * h)
  Next i

' Masukkan hasilnya kedalam fungsi
  Simpson = Sum * h / 3
```

End Function

```
Function GaussLegendre(XBawah As Double, XAtas As Double, n As Integer) As Double
```

```
Dim SX As Double, DX As Double, Integral As Double
```

```
' Hitung jumlah dan selisih batas, untuk keperluan mapping
```

```
  SX = (XBawah + XAtas) / 2
```

```
  DX = (XAtas - XBawah) / 2
```

```
' Hitung kuadratur
```

```
  Select Case n
```

```
    Case 1, 2 ' diambil dari Carnahan hal. 103
```

```
      Integral = f(SX - DX * 0.577350269189626) + f(SX + DX * 0.577350269189626)
```

```
    Case 3 ' diambil dari Carnahan hal. 103
```

```
      Integral = 0.555555555555556 * (f(SX - DX * 0.774596669241483) +  
        f(SX + DX * 0.774596669241483)) +  
        0.888888888888889 * f(SX + DX * 0#)
```

```
    Case 4 ' diambil dari Carnahan hal. 103
```

```
      Integral = 0.652145154862546 * (f(SX - DX * 0.339981043584856) +  
        f(SX + DX * 0.339981043584856)) +  
        0.347854845137454 * (f(SX - DX * 0.861136311594053) +  
        f(SX + DX * 0.861136311594053))
```

```
    Case 5 ' diambil dari Carnahan hal. 103
```

```
      Integral = 0.478628670499366 * (f(SX - DX * 0.538469310105683) +  
        f(SX + DX * 0.538469310105683)) +  
        0.236926885056189 * (f(SX - DX * 0.906179845938664) +  
        f(SX + DX * 0.906179845938664)) +  
        0.568888888888889 * f(SX + DX * 0#)
```

```
    Case 6 ' diambil dari Carnahan hal. 103
```

```
      Integral = 0.467913934572691 * (f(SX - DX * 0.238619186083197) +  
        f(SX + DX * 0.238619186083197)) +  
        0.360761573048139 * (f(SX - DX * 0.661209386466265) +  
        f(SX + DX * 0.661209386466265)) +  
        0.17132449237917 * (f(SX - DX * 0.932469514203152) +  
        f(SX + DX * 0.932469514203152))
```

```
    Case 7 ' diambil dari Atkinson hal. 276
```

```
      Integral = 0.1294849662 * (f(SX - DX * 0.9491079123) +  
        f(SX + DX * 0.9491079123)) +  
        0.2797053915 * (f(SX - DX * 0.7415311856) +  
        f(SX + DX * 0.7415311856)) +  
        0.3818300505 * (f(SX - DX * 0.4058451514) +  
        f(SX + DX * 0.4058451514)) +  
        0.4179591837 * f(SX + DX * 0#)
```

```
    Case 8 ' diambil dari Atkinson hal. 276
```

```
      Integral = 0.1012285363 * (f(SX - DX * 0.9602898565) +  
        f(SX + DX * 0.9602898565)) +  
        0.2223810345 * (f(SX - DX * 0.7966664774) +  
        f(SX + DX * 0.7966664774)) +  
        0.3137066459 * (f(SX - DX * 0.5255324099) +  
        f(SX + DX * 0.5255324099)) +  
        0.3626837834 * (f(SX - DX * 0.1834346425) +  
        f(SX + DX * 0.1834346425))
```

```
    Case 10 ' diambil dari Carnahan hal. 103
```

```
      Integral = 0.295524224714753 * (f(SX - DX * 0.148874338981631) +  
        f(SX + DX * 0.148874338981631)) +  
        0.269266719309996 * (f(SX - DX * 0.433395394129247) +  
        f(SX + DX * 0.433395394129247)) +  
        0.219086362515982 * (f(SX - DX * 0.679409568299024) +  
        f(SX + DX * 0.679409568299024)) +  
        0.149451349150581 * (f(SX - DX * 0.865063366688985) +  
        f(SX + DX * 0.865063366688985)) +  
        0.066671344308688 * (f(SX - DX * 0.973906528517172) +  
        f(SX + DX * 0.973906528517172))
```

```
    Case Else
```

```
      ' Case 15 diambil dari Carnahan hal. 103
```

```
      Integral = 0.198431485327111 * (f(SX - DX * 0.201194093997435) +  
        f(SX + DX * 0.201194093997435)) +  
        0.186161000115562 * (f(SX - DX * 0.394151347077563) +  
        f(SX + DX * 0.394151347077563)) +  
        0.166269205816994 * (f(SX - DX * 0.570972172608539) +  
        f(SX + DX * 0.570972172608539)) +  
        0.139570677926154 * (f(SX - DX * 0.72441773136017) +  
        f(SX + DX * 0.72441773136017)) +  
        0.107159220467172 * (f(SX - DX * 0.848206583410427) +  
        f(SX + DX * 0.848206583410427)) +  
        0.070366047488108 * (f(SX - DX * 0.937273392400706) +  
        f(SX + DX * 0.937273392400706)) +
```

```

0.030753241996117 * (f(SX - DX * 0.987992518020485) +
                      f(SX + DX * 0.987992518020485)) +
0.202578241925561 * f(SX + DX * 0#)

End Select

' Koreksi hitungan
GaussLegendre = Integral * DX

End Function

Function GaussLaguerre(X As Double, n As Integer) As Double

Dim Integral As Double

' Hitung kuadratur
Select Case n
    Case 1, 2 ' diambil dari Carnahan hal. 113
        Integral = 0.853553390593 * f(0.585786437627 + X) * Exp(0.585786437627) +
                  0.146446609407 * f(3.414213562373 + X) * Exp(3.414213562373)
    Case 3 ' diambil dari Carnahan hal. 113
        Integral = 0.711093009929 * f(0.415774556783 + X) * Exp(0.415774556783) +
                  0.278517733569 * f(2.294280360279 + X) * Exp(2.294280360279) +
                  0.0103892565016 * f(6.289945082937 + X) * Exp(6.289945082937)
    Case 4 ' diambil dari Carnahan hal. 113
        Integral = 0.603154104342 * f(0.322547689619 + X) * Exp(0.322547689619) +
                  0.357418692438 * f(1.745761101158 + X) * Exp(1.745761101158) +
                  0.038887908515 * f(4.536620296921 + X) * Exp(4.536620296921) +
                  0.000539294705561 * f(9.395070912301 + X) * Exp(9.395070912301)
    Case 5 ' diambil dari Carnahan hal. 114
        Integral = 0.521755610583 * f(0.263560319718 + X) * Exp(0.263560319718) +
                  0.398666811083 * f(1.413403059107 + X) * Exp(1.413403059107) +
                  0.0759424496817 * f(3.596425771041 + X) * Exp(3.596425771041) +
                  0.00361175867992 * f(7.085810005859 + X) * Exp(7.085810005859) +
                  2.33699723858E-05 * f(12.640800844276 + X) * Exp(12.640800844276)
    Case 6 ' diambil dari Carnahan hal. 114
        Integral = 0.45896467395 * f(0.222846604179 + X) * Exp(0.222846604179) +
                  0.417000830772 * f(1.188932101673 + X) * Exp(1.188932101673) +
                  0.113373382074 * f(2.992736326059 + X) * Exp(2.992736326059) +
                  0.0103991974531 * f(5.775143569105 + X) * Exp(5.775143569105) +
                  0.000261017202815 * f(9.837467418383 + X) * Exp(9.837467418383) +
                  8.9854790643E-07 * f(15.982873980602 + X) * Exp(15.982873980602)
    Case 10 ' diambil dari Carnahan hal. 114
        Integral = 0.308441115765 * f(0.13779347054 + X) * Exp(0.13779347054) +
                  0.401119929155 * f(0.729454549503 + X) * Exp(0.729454549503) +
                  0.218068287612 * f(1.80834290174 + X) * Exp(1.80834290174) +
                  0.0620874560987 * f(3.401433697855 + X) * Exp(3.401433697855) +
                  0.00950151697518 * f(5.552496140064 + X) * Exp(5.552496140064) +
                  0.000753008388588 * f(8.330152746764 + X) * Exp(8.330152746764) +
                  0.000028259233496 * f(11.8437858379 + X) * Exp(11.8437858379) +
                  4.24931398496E-07 * f(16.279257831378 + X) * Exp(16.279257831378) +
                  1.83956482398E-09 * f(21.996585811981 + X) * Exp(21.996585811981) +
                  9.91182721961E-13 * f(29.920697012274 + X) * Exp(29.920697012274)
    Case Else
        ' Case 15 diambil dari Carnahan hal. 114
        Integral = 0.21823488594 * f(0.093307812017 + X) * Exp(0.093307812017) +
                  0.342210177923 * f(0.492691740302 + X) * Exp(0.492691740302) +
                  0.263027577942 * f(1.215595412071 + X) * Exp(1.215595412071) +
                  0.126425818106 * f(2.269949526204 + X) * Exp(2.269949526204) +
                  0.040206864921 * f(3.667622721751 + X) * Exp(3.667622721751) +
                  0.00856387780361 * f(5.425336627414 + X) * Exp(5.425336627414) +
                  0.00121243614721 * f(7.565916226613 + X) * Exp(7.565916226613) +
                  0.000111674392344 * f(10.120228568019 + X) * Exp(10.120228568019) +
                  6.45992676202E-06 * f(13.130282482176 + X) * Exp(13.130282482176) +
                  2.2263169071E-07 * f(16.65440770833 + X) * Exp(16.65440770833) +
                  4.22743038498E-09 * f(20.776478899449 + X) * Exp(20.776478899449) +
                  3.92189726704E-11 * f(25.623894226729 + X) * Exp(25.623894226729) +
                  1.45651526407E-13 * f(31.407519169754 + X) * Exp(31.407519169754) +
                  1.48302705111E-16 * f(38.530683306486 + X) * Exp(38.530683306486) +
                  1.60059490621E-20 * f(48.026085572686 + X) * Exp(48.026085572686)
End Select

' Koreksi hitungan
GaussLaguerre = Integral

End Function

```

```
Function GaussChebyshev(XBawah As Double, XAtas As Double, n As Integer) As Double
Dim Z As Double, SX As Double, DX As Double, Integral As Double, i As Integer
Dim Phi As Double

' Hitung jumlah dan selisih batas, untuk keperluan mapping
SX = (XBawah + XAtas) / 2
DX = (XAtas - XBawah) / 2

' Hitung kuadratur (dari Carnahan hal. 117)
Integral = 0#
Phi = Application.WorksheetFunction.Pi()
For i = 1 To n
    Z = Cos(Phi * (i - 0.5) / n)
    Integral = Integral + Sqr(1 - Z * Z) * f(Z * DX + SX)
Next i

' Koreksi hitungan
GaussChebyshev = Integral * DX * Phi / n

End Function
```