GAUSS LEGENDRE QUADRATURE

```
function f=F(x)
   f=(3+x)^4+1
endfunction
w=[8/9 5/9 5/9]
x=[0 0.774597 -0.774597]
sum=0
for i=1:3
   sum=sum+w(i)*F(x(i))
end
disp(sum)
```

GAUSS HERMITE QUADRATURE

```
function f=F(x)
   f=(sqrt(2)*sigma*x+5)/sqrt(%pi)
endfunction
sigma=0.01
w=[0.886227 0.886227]
x=[-1/sqrt(2) 1/sqrt(2)]
//x=[-1.65068 -0.524648 0.524648 1.65068]
//w=[0.0813128 0.804914 0.804914 0.0813128]
sum=0
for i=1:2
   sum=sum+w(i)*F(x(i))
end
disp(sum)
```

DIRAC DELTA SIMPSON

```
funcprot(0)
function f=F(x, sigma)
   f=exp((-(x-2)^2)/2*(sigma)^2)*(x+3)
endfunction
```

```
sigma=1
      a=-10;b=10;n=45;
   h=(b-a)/n;
   sum=F(a)
   for i=1:n-1
      x=a+i*h;
      if modulo(i,2)==0 then
         sum=sum+2*F(x,sigma);
      else
         sum=sum+4*F(x,sigma);
   end
end
sum=(h/3)*(F(b)+F(a)+sum);
sum=sum/sqrt(2*(%pi)*sigma^2)
disp(sum)
```

ORTHOGONALITY

```
funcprot(0)
clc
clear
function pl=p(n, x)
   sum=0
   for m=0:n/2
     den=factorial(m)*factorial(n-m)*(2^n)*factorial(n-2*m)
      sum=sum+((-1)^m)*factorial(2*n-2*m)*(x.^(n-2*m))/den
   end
   pl=sum
endfunction
m=input("value of m:")
n=input("value of n:")
w=[0.3478548451 0.3478548451 0.6521451549 0.6521451549]
x=[0.8611363116 0.8611363116 0.3399810436 -0.3399810436]
sum=0
for i=1:4
   sum=sum+w(i)*p(n,x(i))*p(m,x(i))
end
disp(sum)
```

GAUSS LAGUERRE QUADRAATURE

```
funcprot(0)
function f=p(x)
   f=exp(x)/(x^2+2)
endfunction
n=input("Enter the value of n for n point Gauss quadrature method :")
x=[0.585786 3.41421 0 0 0 0;
0.41577 2.29428 6.28995 0 0 0;
0.322548 1.74576 4.53662 9.39507 0 0;
0.26356 1.4134 3.59643 7.08581 12.6408 0]
w=[0.853553 0.146447 0 0 0 0;
0.711093 0.278518 0.0103893 0 0 0;
0.603154 0.357419 0.0388879 0.000539295 0 0;
0.521756 0.398667 0.0759424 0.00361176 0.00002337 0]
suml=0
for i=1:5
   suml=suml+w(n-1,i)*p(x(n-1,i));
   end
disp(suml)
```

```
SQUARE WAVE
funcprot(0)
function f=F1(x, l, n1)
        f=-2
endfunction
function f=F3(x, l, n1)
   f=-2*cos((n1*%pi*x)/l)
endfunction
function f=F5(x, l, n1)
   f=-2*sin((n1*%pi*x)/l)
endfunction
function f=F2(x, l, n1)
        f=2
endfunction
function f=F4(x, l, n1)
   f=2*cos((n1*%pi*x)/l)
endfunction
function f=F6(x, l, n1)
   f=2*sin((n1*%pi*x)/l)
endfunction
function y=g(x, h, F, l, n1)
    sum=0
   for i=1:n-1
   x(i+1)=x(i)+h
   if modulo(i,2)==0 then
      sum=sum+2*F(x(i+1),l,n1);
   else
       sum=sum+4*F(x(i+1),l,n1)
   end
end
y=(h/3)*(sum+F(a)+F(b))
endfunction
a0=[]
an=[]
bn=[]
for i=1:100
n=300
a=-10
b=0
l=10
x(1)=a
x(n+1)=b
h=(b-a)/n
sol3=g(x,h,F3,l,i)
sol5=g(x,h,F5,l,i)
sol1=g(x,h,F1,l,i)
   a=0
   b=10
   x(1)=a
```

```
    x(n+1)=b
    h=(b-a)/n
    x(n+1)=b
    h=(b-a)/n
    sol2=g(x,h,F2,l,i)
    sol4=g(x,h,F4,l,i)
    sol6=g(x,h,F6,l,i)
a0(i)=(sol1+sol2)/2*l
an(i)=(sol3+sol4)/l
bn(i)=(sol5+sol6)/l
end
disp(a0)
disp(an)
disp(bn)
x=0:100
sum=0
for i=1:30
    sum=sum+(an(i)*cos((i*%pi*x)/l))+(bn(i)*sin((i*%pi*x)/l))
end
y=sum

plot2d(x,y,3)

xgrid(4)
xtitle("Plot x vs y","x","y")
```

TRIANGLE WAVE

```
funcprot(0)
function f=F1(x, l, n1)
       f=50*x
endfunction
function f=F2(x, l, n1)
   f=50*x*cos(n1*%pi*x/l)
endfunction
function f=F3(x, l, n1)
   f=50*x*sin(n1*%pi*x/l)
endfunction
function f=F4(x, l, n1)
       f=-50*x+100
endfunction
function f=F5(x, l, n1)
```

```
   f=(-50*x+100)*cos(n1*%pi*x/l)
endfunction
function f=F6(x, l, n1)
   f=(-50*x+100)*sin(n1*%pi*x/l)
endfunction
function f=F7(x, l, n1)
      f=50*x-200
endfunction
function f=F8(x, l, n1)
   f=(50*x-200)*cos(n1*%pi*x/l)
endfunction
function f=F9(x, l, n1)
   f=(50*x-200)*sin(n1*%pi*x/l)
endfunction
function y=g(x, h, F, l, n1)
    sum=0
   for i=1:n-1
   x(i+1)=x(i)+h
   if (modulo(i,2)==1) then
     sum=sum+2*F(x(i+1),l,n1);
   else
      sum=sum+4*F(x(i+1),l,n1)
   end
   end
y=(h/3)*(sum+F(a)+F(b))
endfunction
a0=[]
an=[]
bn=[]
for i=1:10
n=300
a=0
b=1
l=4
x(1)=a
x(n+1)=b
h=(b-a)/n
sol1=g(x,h,F1,l,i)
sol2=g(x,h,F2,l,i)
sol3=g(x,h,F3,l,i)
   a=1
   b=3
   x(1)=a
   x(n+1)=b
   h=(b-a)/n
sol4=g(x,h,F4,l,i)
sol5=g(x,h,F5,l,i)
sol6=g(x,h,F6,l,i)
   a=3
```

```
    b=4
    x(1)=a
    x(n+1)=b
    h=(b-a)/n
sol7=g(x,h,F7,l,i)
sol8=g(x,h,F8,l,i)
sol9=g(x,h,F9,l,i)
a0=(sol1+sol4+sol7)/2*l
an(i)=(sol2+sol5+sol8)/l
bn(i)=(sol3+sol6+sol9)/l
end
disp(a0)
disp(an)
disp(bn)
x=0:4
sum=0
for i=1:10
    sum=sum+(an(i)*cos((i*%pi*x)/l))+(bn(i)*sin((i*%pi*x)/l))
end
y=sum
plot2d(x,y,3)
xgrid(4)
xtitle("Plot x vs y","x","y")
```