

```
> f:= 1-abs(x);
```

$$f:=1-|x|$$

(1)

```
> T := 1/2*( (x+sqrt(x^2-1))^k + (x-sqrt(x^2-1))^k);
```

$$T:=\frac{1}{2}\left(x+\sqrt{x^2-1}\right)^k+\frac{1}{2}\left(x-\sqrt{x^2-1}\right)^k$$

(2)

```
> for kk from 0 to 10 do
```

```
  if kk = 0 then
```

```
    c[kk] := 1/Pi*int(f*subs(k=kk,T)*1/sqrt(1-x^2),x=-1..1);
```

```
  else
```

```
    c[kk] := 2/Pi*int(f*subs(k=kk,T)*1/sqrt(1-x^2),x=-1..1);
```

```
  fi;
```

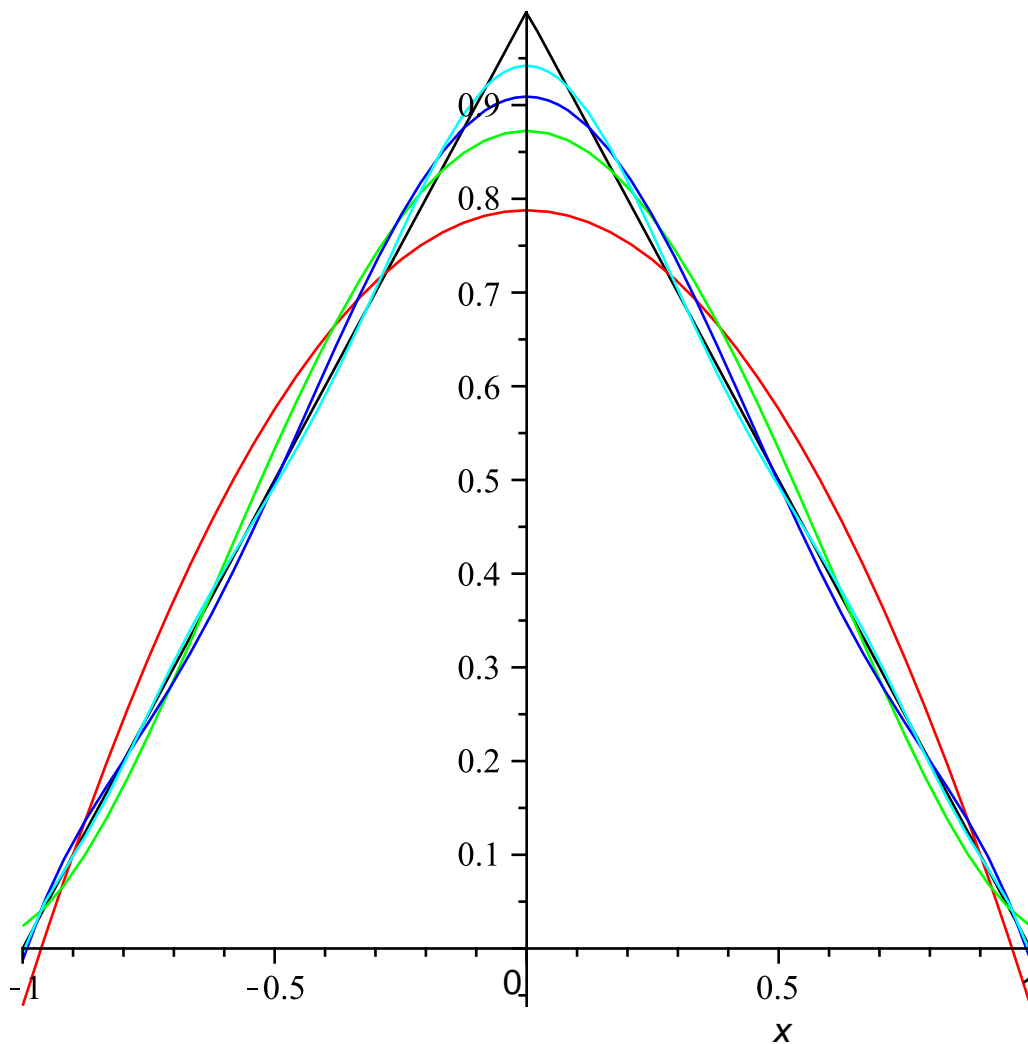
```
od;
```

```
> for n in [2,5,7,10] do
```

```
  fn[n] := sum(c[j]*subs(k=j,T),j=0..n);
```

```
od:
```

```
> plot([f,fn[2],fn[5],fn[7],fn[10]],x=-1..1,color=[black,red,  
green,blue,cyan]);
```



```

> for n in [2,5,10] do
  print(n);
  for a in [1/2,1/4,0,-1/3] do
    print(a,evalf(evalc(abs( subs(x=a,f-fn[n])))))
  od
od;

```

2

$\frac{1}{2}$, 0.0755868186
 $\frac{1}{4}$, 0.0152582384
0, 0.2122065907
 $-\frac{1}{3}$, 0.0268127022

5

$\frac{1}{2}$, 0.0331455003
 $\frac{1}{4}$, 0.0298356621
0, 0.1273239544
 $-\frac{1}{3}$, 0.0446275765

10

$\frac{1}{2}$, 0.0069073452
 $\frac{1}{4}$, 0.0125165455
0, 0.05787452474
 $-\frac{1}{3}$, 0.0026591043

(3)

Alternativ mit Funktionen

```

> restart;
> f:= x -> 1-abs(x);

```

$$f:=x \rightarrow 1 - |x|$$

(4)

```

> T := (x,k) -> 1/2*( (x+sqrt(x^2-1))^k + (x-sqrt(x^2-1))^k);

```

$$T := (x, k) \rightarrow \frac{1}{2} \left(x + \sqrt{x^2 - 1} \right)^k + \frac{1}{2} \left(x - \sqrt{x^2 - 1} \right)^k$$

(5)

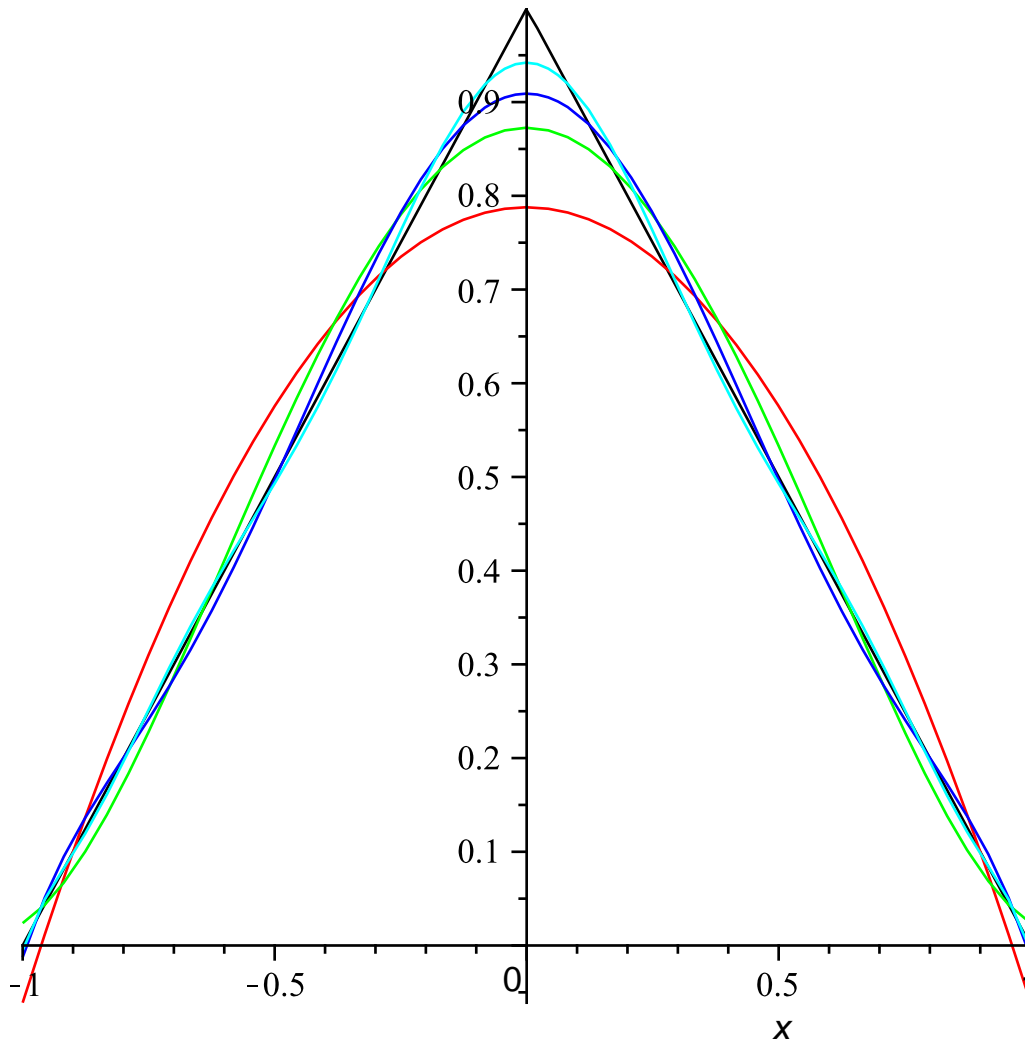
```

> for k from 0 to 10 do
  if k = 0 then
    c[k] := value(1/Pi*int(f(x)*T(x,k)*1/sqrt(1-x^2),x=-1..1));
  else
    c[k] := value(2/Pi*int(f(x)*T(x,k)*1/sqrt(1-x^2),x=-1..1));
  fi;

```

```
od;
```

```
> for n in [2,5,7,10] do  
  fn[n] := sum(c[kk]*T(x,kk),kk=0..n);  
od:  
> plot([f(x),seq(fn[n],n in [2,5,7,10])],x=-1..1,color=[black,  
red,green,blue,cyan]);
```



```
> for n in [2,5,10] do  
  print(n,seq(evalf(evalc(abs(subs(x=a,f-fn[n])))),a in [1/2,  
1/4,0,-1/3]));  
od;
```

```
2, 0.0755868186, 0.0152582384, 0.2122065907, 0.0268127022  
5, 0.0331455003, 0.0298356621, 0.1273239544, 0.0446275765  
10, 0.0069073452, 0.0125165455, 0.05787452474, 0.0026591043
```

(6)