

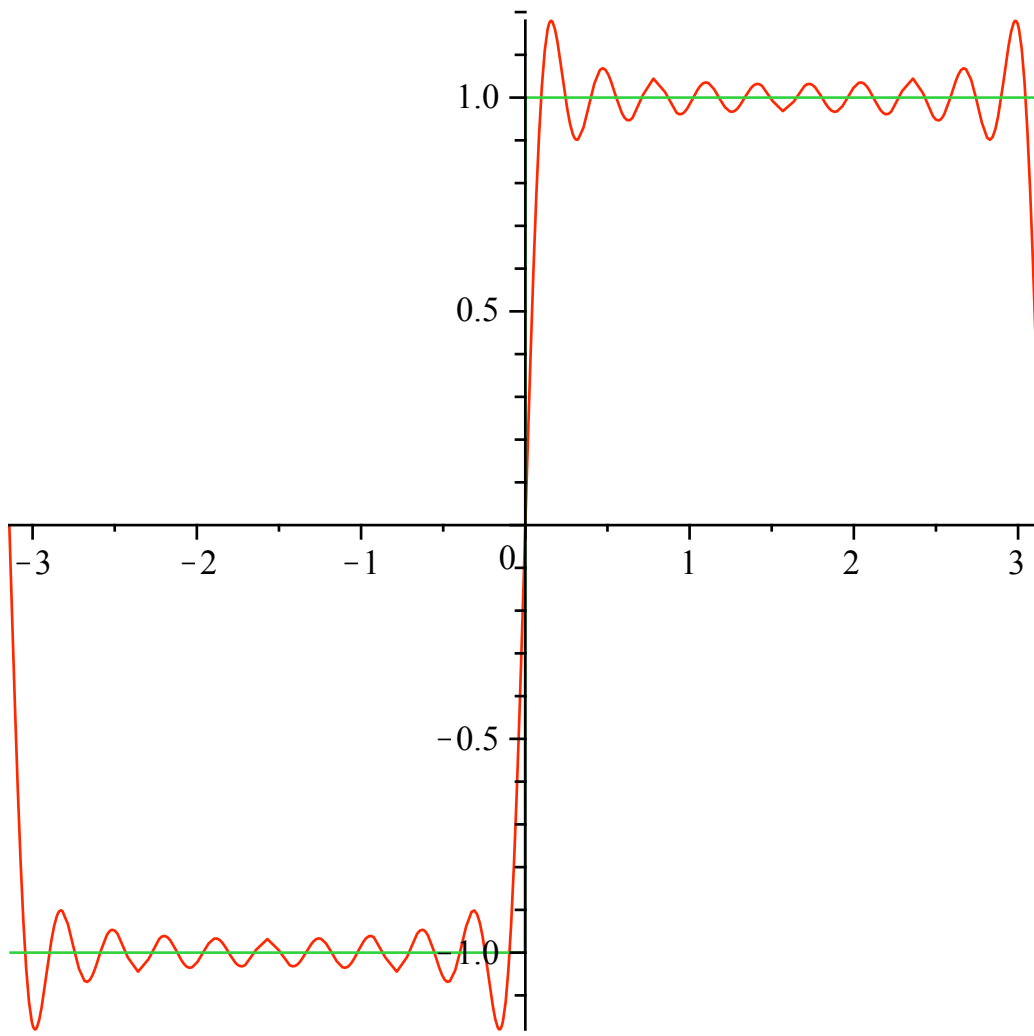
## Gibb's phenomenon (example 9.1.1 in the book)

### Step function (square wave)

```
> stepfun := t -> piecewise(-Pi<t and t<0,-1,0<t and t<Pi,1);  
   stepfun := t -> piecewise(-π < t and t < 0, -1, 0 < t and t < π, 1) (1.1)
```

```
> f := (t,N) -> (4/Pi)*sum(sin((2*k-1)*t)/(2*k-1),k=1..N);  
   f := (t, N) ->  $\frac{4 \left( \sum_{k=1}^N \frac{\sin((2k-1)t)}{2k-1} \right)}{\pi}$  (1.2)
```

```
> plot({f(t,10),stepfun(t)},t=-Pi..Pi);
```



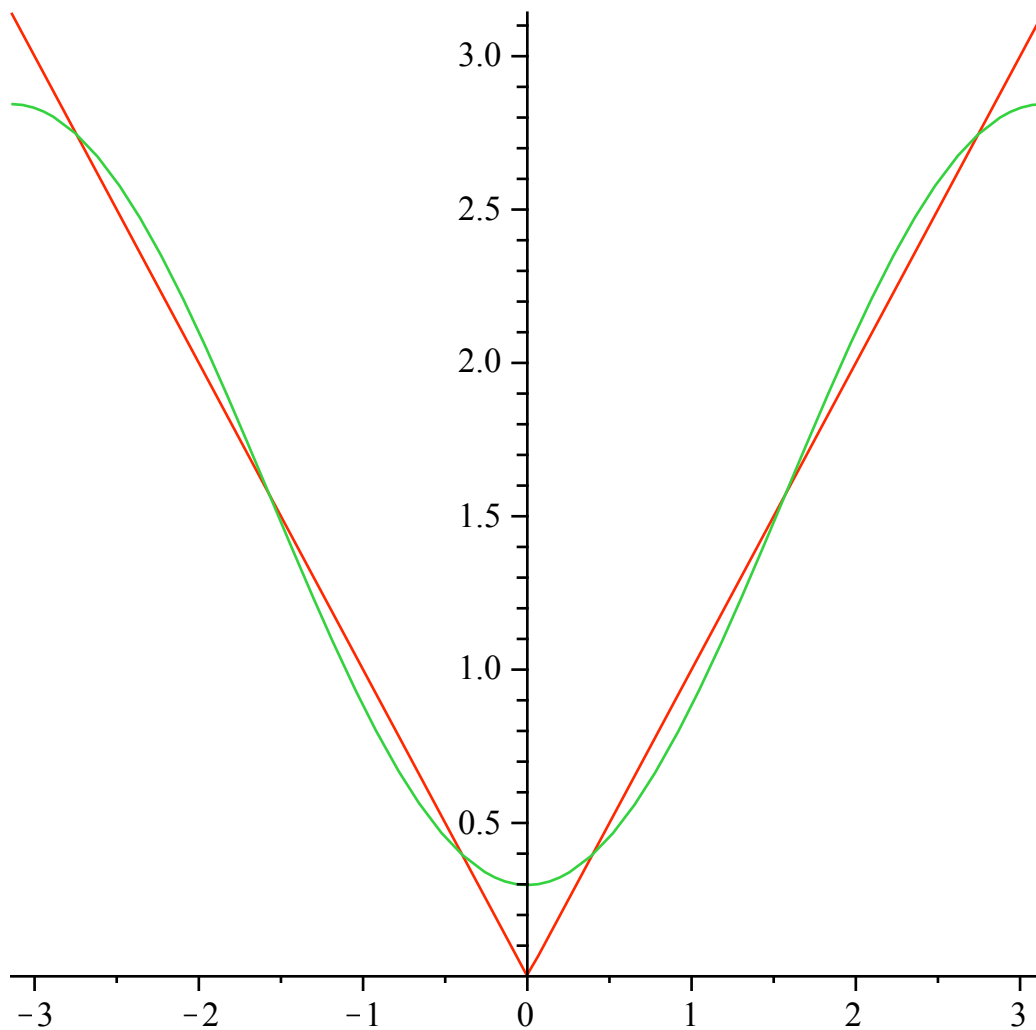
### Even saw tooth function

```
> sawtoothfun := t -> abs(t);  
   sawtoothfun := t -> |t| (2.1)
```

```
> g := (t,N) -> Pi/2 + sum(-4*Pi*cos((2*k-1)*t)/((2*k-1)*Pi)  
   ^2, k=1..N); (2.2)
```

$$g := (t, N) \rightarrow \frac{1}{2} \pi + \sum_{k=1}^N \left( -\frac{4 \pi \cos((2k-1)t)}{(2k-1)^2 \pi^2} \right) \quad (2.2)$$

```
> plot({g(t,1), sawtoothfun(t)}, t=-Pi..Pi);
```



### ▼ Odd saw tooth function

```
> sawtoothfun2 := t -> t;
      sawtoothfun2 := t -> t
```

```
> h := (t, N) -> sum( (-1)^(n+1) * (2/n) * sin(n*t), n=1..N);
```

$$h := (t, N) \rightarrow \sum_{n=1}^N \frac{2 (-1)^{n+1} \sin(n t)}{n} \quad (3.2)$$

```
> plot({h(t,10), sawtoothfun2(t)}, t=-Pi..Pi);
```

