```
> # Find Fourier sin coefficients for
  # f(x)=1 on x<L/2, f(x)=0 elsewhere
> L:=1;
```

$$L := 1 \tag{1}$$

```
> f:=x->piecewise(x<0,0, x<L/2,1,0);
```

$$f := x \to piecewise\left(x < 0,\ 0,\ x < \frac{1}{2}\ L,\ 1,\ 0\right) \tag{2}$$

```
> convert(f(x),piecewise,x);
```

$$\begin{cases} 0 & x < 0 \\ 1 & x < \frac{1}{2} \\ 0 & \frac{1}{2} \le x \end{cases} \tag{3}$$

```
> B:=n->eval((2/L)*int(f(x)*sin(n*Pi*x/L),x=0..L));
```

$$B := n \to eval\left(\frac{2\left(\int_0^L f(x)\ \sin\left(\frac{n\pi x}{L}\right)\ dx\right)}{L}\right) \tag{4}$$

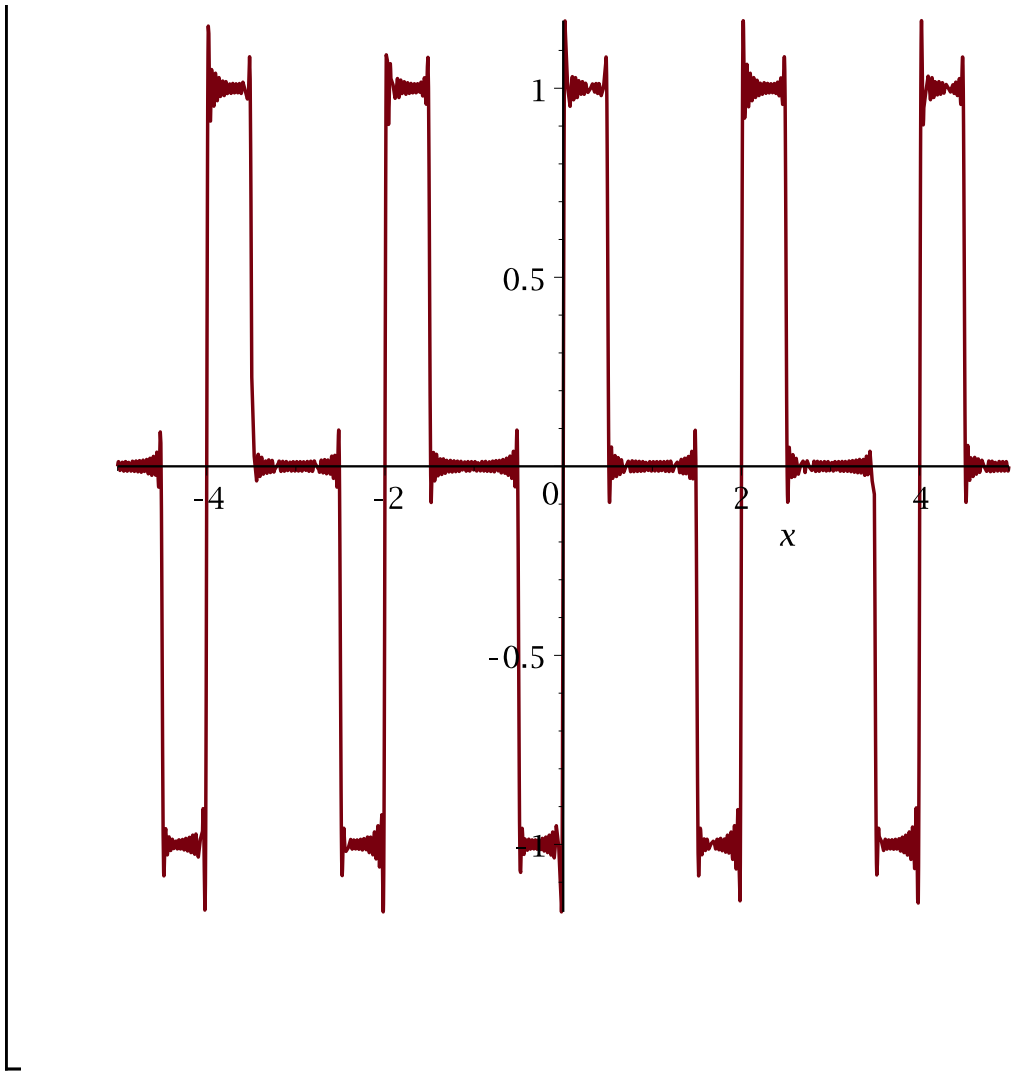
```
> B(1);B(n) assuming n >0;
```

$$\frac{2}{\pi}$$

$$-\frac{2\left(-1+\cos\left(\frac{1}{2}\ n\pi\right)\right)}{n\pi} \tag{5}$$

```
> # Truncated sine series S(x,n)
> S:=(x,n)->sum(B(k)*sin(k*Pi*x/L),k=1..n);plot(S(x,50),x=-5*L..5*
  L);
```

$$S := (x,\ n) \to \sum_{k=1}^{n} B(k)\ \sin\left(\frac{k\pi x}{L}\right)$$


1
0.5
-0.5
-1
-4
-2
0
2
4
x