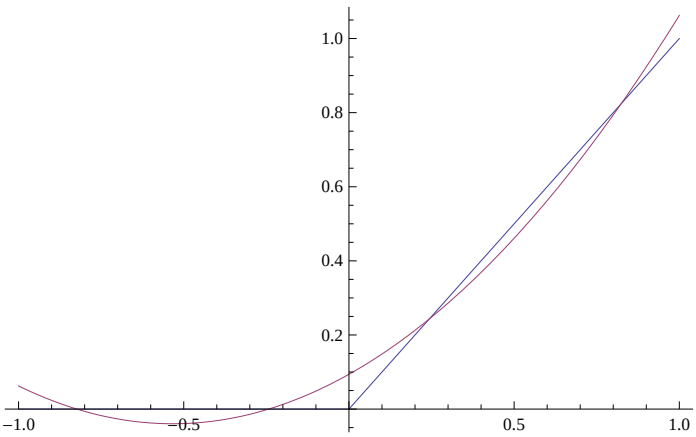
Here are the partial sums of the Fourier-Legendre series for f(x)=x on [0,1) and 0 on (-1,0], using sums through P3 and through P7.

```
Table[(n + 1 / 2) Integrate[LegendreP[n, x] (x + Abs[x]) / 2, {x, -1, 1}], {n, 0, 3}]
```

$$\left\{\frac{1}{4}, \frac{1}{2}, \frac{5}{16}, 0\right\}$$

```
Plot[{(x + Abs[x]) / 2, %.Table[LegendreP[n - 1, x], {n, Length[%]}]}, {x, -1, 1}]
```




```
Table[(n + 1 / 2) Integrate[LegendreP[n, x] (x + Abs[x]) / 2, {x, -1, 1}], {n, 0, 7}]
```

$$\left\{\frac{1}{4}, \frac{1}{2}, \frac{5}{16}, 0, -\frac{3}{32}, 0, \frac{13}{256}, 0\right\}$$

```
Plot[{(x + Abs[x]) / 2, %.Table[LegendreP[n - 1, x], {n, Length[%]}]}, {x, -1, 1}]
```