

```
In[83]:= $Assumptions = {n, k} ∈ Integers;
```

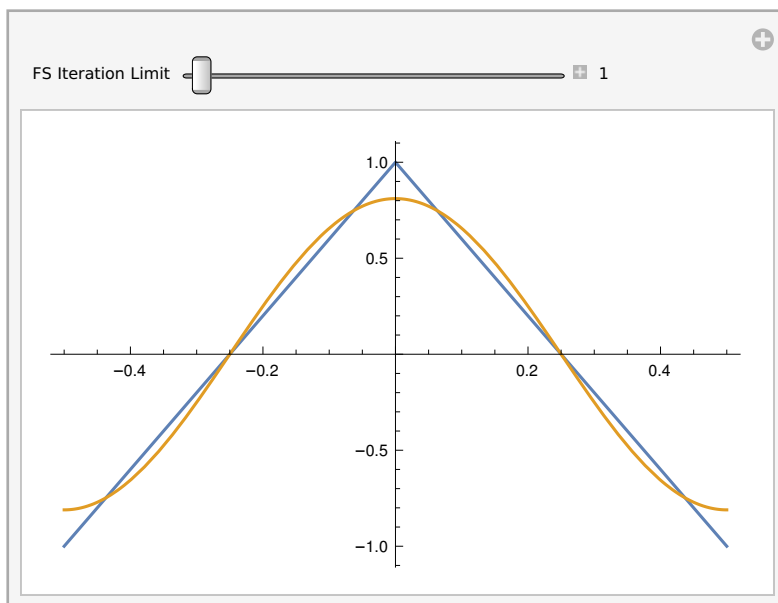
The Fourier Expansion of a Triangle Wave in a Non-Standard Domain

```
In[65]:= triangle[x_] := -4 Abs[x] + 1;
```

```
fparams = {1, 2 Pi}; (* Period 1 *)
```

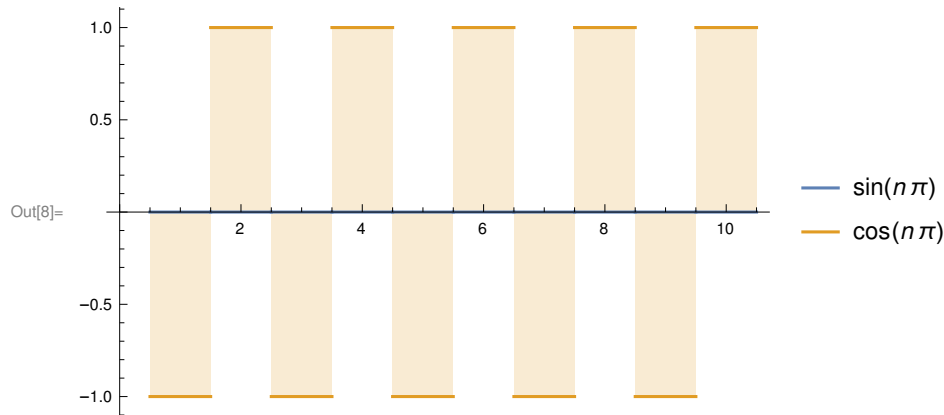
```
In[69]:= Manipulate[
  Plot[
    {triangle[x],
     Evaluate[FourierSeries[triangle[x], x, iter, FourierParameters → fparams]]},
    {x, -1/2, 1/2}],
  {{iter, 1, "FS Iteration Limit"}, 1, 10, 1, Appearance → "Labeled"}]
```

Out[69]=



Trigonometric Simplifications for Integer Multiples of Pi

```
In[8]:= DiscretePlot[{Sin[n Pi], Cos[n Pi]}, {n, 1, 10},
  ExtentSize → Full, PlotLegends → "Expressions"]
```



Real Fourier Coefficients (Discrete Sine and Cosine, with Modified Parameters)

```
In[76]:= Simplify[FourierCosCoefficient[triangle[x], x, n,
  FourierParameters → fparams], Assumptions → n ≠ 0]
(* a_0 = 2 - 4 Pi *)
```

Out[76]=

$$\frac{2(-1 + (-1)^n)^2}{n^2 \pi^2}$$

```
In[90]:= Simplify[FourierSinCoefficient[triangle[x], x, 2 k + 1,
  FourierParameters → fparams]]
```

Out[90]= 0

Complex Fourier Coefficients (Integrated Exponential Form, with Canonical Parameters)

```
In[86]:= Simplify[FourierCoefficient[triangle[x], x, n], Assumptions → n ≠ 0]
(* c_0 = 1 - 2 Pi *)
```

Out[86]=

$$-\frac{4(-1 + (-1)^n)}{n^2 \pi}$$