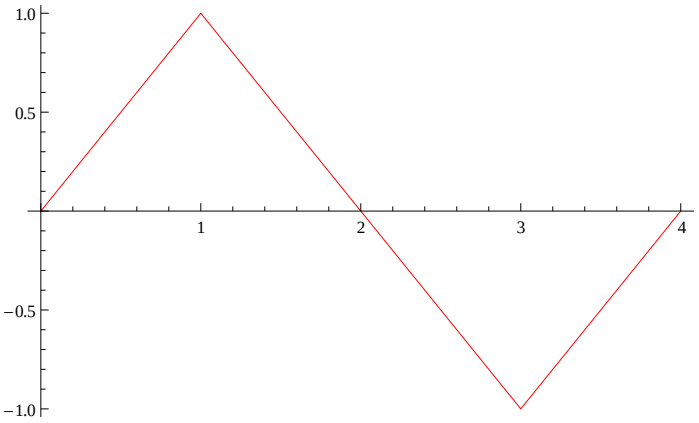
```
?If
```

If[*condition*, *t*, *f*] gives *t* if *condition* evaluates to True, and *f* if it evaluates to False.

If[*condition*, *t*, *f*, *u*] gives *u* if *condition* evaluates to neither True nor False. ≫

```
f[t_] = If[0 < t < 1, t, If[1 < t < 3, 2 - t, t - 4]];

p1 = Plot[f[t], {t, 0, 4}, PlotStyle → RGBColor[1, 0, 0]]
```




```
T = 4; ω = 2π / T
```

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

```
a[n_] = 2 / T Integrate[Cos[n ω t] * f[t], {t, 0, T}, Assumptions → Element[n, Integers]] // Simplify
```

$$\frac{16 \sin\left[\frac{n\pi}{4}\right]^2 \sin\left[\frac{n\pi}{2}\right] \sin[n\pi]}{n^2 \pi^2}$$

```
a[0] = Limit[a[n], n → 0]
```

```
0
```

```
Table[{n, a[n]}, {n, 0, 10}] // TableForm
```

```
0     0
1     0
2     0
3     0
4     0
5     0
6     0
7     0
8     0
9     0
10    0
```

```
b[n_] = 2 / T Integrate[Sin[n ω t] * f[t], {t, 0, T}, Assumptions → Element[n, Integers]] // Simplify
```

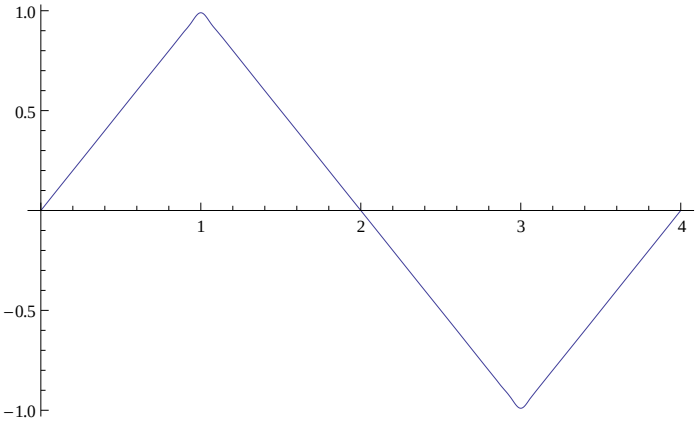
$$-\frac{32 \cos\left[\frac{n\pi}{4}\right] \cos[n\pi] \sin\left[\frac{n\pi}{4}\right]^3}{n^2 \pi^2}$$

```
Table[{n, b[n]}, {n, 1, 10}] // TableForm
```

1	$\frac{8}{\pi^2}$
2	0
3	$-\frac{8}{9\ \pi^2}$
4	0
5	$\frac{8}{25\ \pi^2}$
6	0
7	$-\frac{8}{49\ \pi^2}$
8	0
9	$\frac{8}{81\ \pi^2}$
10	0

```
q[t_, n_] := Sum[b[k] * Sin[k ω t], {k, 1, n}]
```

```
p2 = Plot[q[t, 40], {t, 0, T}]
```




```
Show[p1, p2]
```