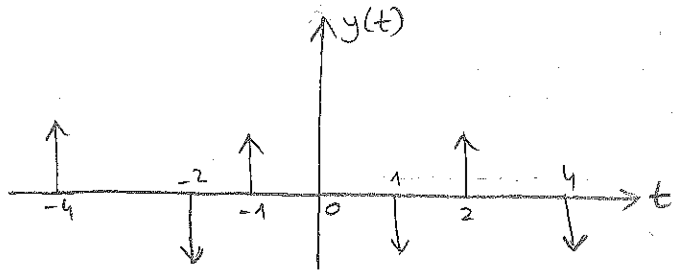
$T=3$ for $x(t)$ $\qquad x(t) = x(t+T)$

We may use the derivative property for $x(t)$, $\boxed{y(t) = \frac{d\,x(t)}{dt}}$

$\boxed{y[k] = jk w_0 \, x[k]}$ where $w_0 = \frac{2\pi}{T}$

$\boxed{x[k] = \frac{1}{jkw_0} \, y[k]}$



$$y[k] = \frac{1}{T}\int_T y(t) e^{-jkw_0 t}\,dt$$

$$\Rightarrow y[k] = \frac{1}{3}\int_{-3/2}^{3/2} (\delta(t+1) - \delta(t-1))\, e^{-jkw_0 t}\,dt$$

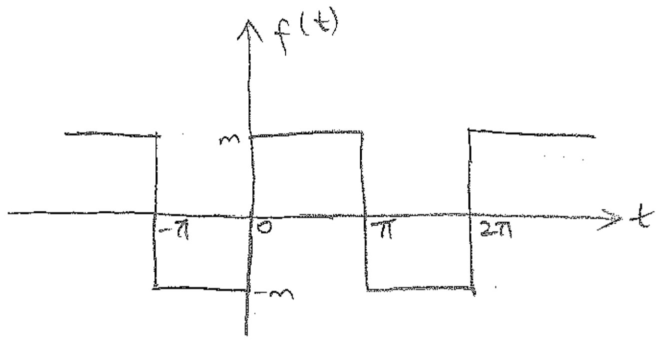
$$\Rightarrow y[k] = \frac{1}{3}\left[e^{jw_0 t} - e^{-jw_0 t}\right] = \boxed{\frac{1}{3}\cdot 2j\sin(w_0 t) \;\Big|\; \text{where } w_0 = \frac{2\pi}{3}}$$

$$x[k] = \frac{1}{jkw_0}\, y[k] \Rightarrow x[k] = \frac{1}{jk\frac{2\pi}{3}} \cdot \frac{1}{3}\, 2j\sin\left(\frac{2\pi}{T}t\right)$$

$x[k] = \frac{1}{k\pi}\sin\left(\frac{2\pi}{3}t\right)$ from here $x(t)$ can be evaluated using $x[k]$

$$x(t) = \sum_{k=-\infty}^{\infty} x[k]\, e^{jkw_0 t} = \boxed{\sum_{k=-\infty}^{\infty} \frac{1}{k\pi}\sin\left(\frac{2\pi}{3}t\right) e^{jk\frac{2\pi}{3}t}}$$

Example



period of $f(t)$ is 2π

Evaluate the Fourier Series representation

$g(t) = f'(t)$