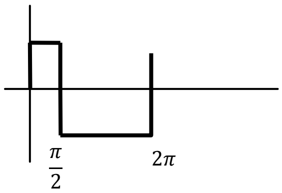
Příklad č. 4



$\omega = 1, T = 2\pi$

Výpočet:

$$s(t) = \begin{matrix} 1 \text{ pro } t \in \langle 0; \frac{\pi}{2} \rangle \\ -1 \text{ pro } t \in \langle \frac{\pi}{2}; 2\pi \rangle \end{matrix}$$

$$c_0 = \frac{1}{T}.\int_0^{2\pi} s(t).dt = \frac{1}{T}.\left\{ \int_0^{\frac{\pi}{2}} 1.dt + \int_{\frac{\pi}{2}}^{2\pi} -1.dt \right\} = \frac{1}{T}.\left\{ [t]_0^{\frac{\pi}{2}} - [t]_{\frac{\pi}{2}}^{2\pi} \right\} =$$

$$= \frac{1}{2\pi}.\left(\frac{\pi}{2} - 0 - 2\pi + \frac{\pi}{2} \right) = -\frac{1}{2}$$

$$c_n = \frac{1}{T}.\int_0^{2\pi} s(t).e^{-j.n.\omega.t}.dt = \frac{1}{T}.\left\{ \int_0^{\frac{\pi}{2}} 1.e^{-j.n.\omega.t}.dt + \int_{\frac{\pi}{2}}^{2\pi} -1.e^{-j.n.\omega.t}.dt \right\} =$$

$$= \frac{1}{T}.\left\{ \left[\frac{e^{-j.n.\omega.t}}{-j.n.\omega} \right]_0^{\frac{\pi}{2}} - \left[\frac{e^{-j.n.\omega.t}}{-j.n.\omega} \right]_{\frac{\pi}{2}}^{2\pi} \right\} =$$

$$= \frac{1}{-j.n.\omega.T}.\left\{ \cos\left(n.\omega.\frac{\pi}{2}\right) - j.\sin\left(n.\omega.\frac{\pi}{2}\right) - 1 - \underbrace{\cos(n.\omega.2\pi)}_{=1} + \right.$$

$$\left. + j.\underbrace{\sin(n.\omega.2\pi)}_{=0} + \cos\left(n.\omega.\frac{\pi}{2}\right) - j.\sin\left(n.\omega.\frac{\pi}{2}\right) \right\} =$$

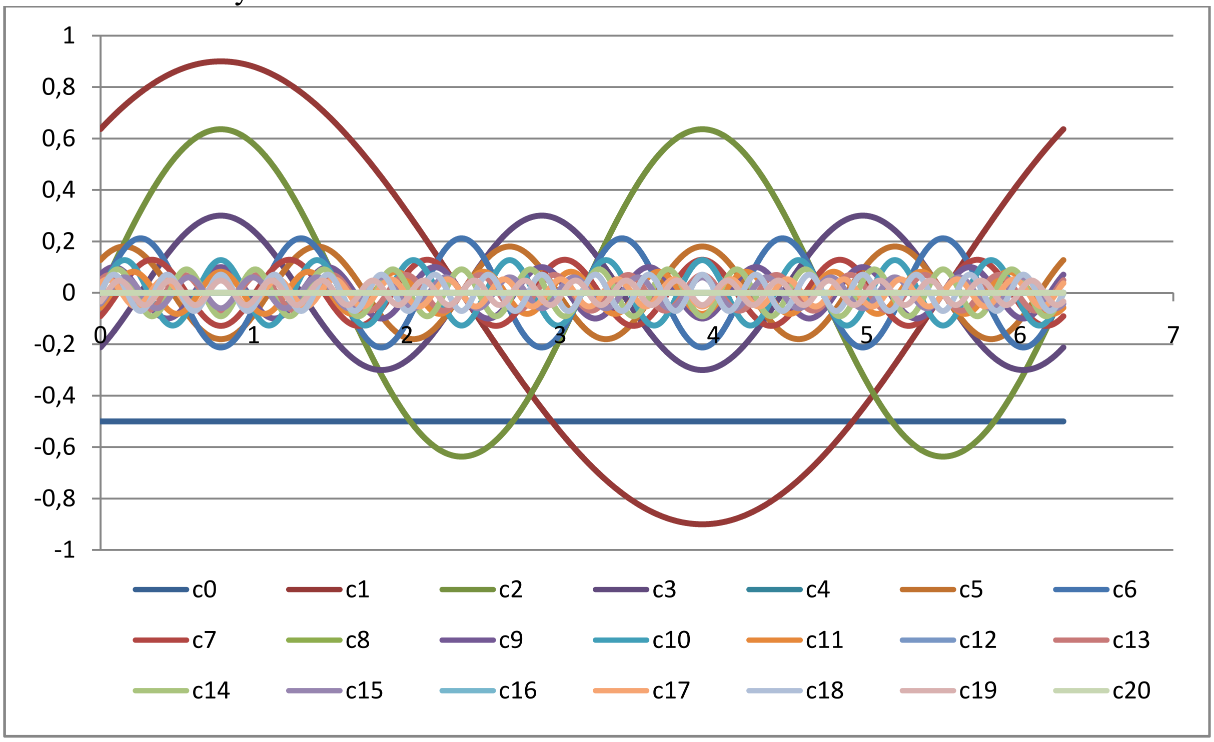
$$= \frac{1}{-j.n.\omega.2\pi}.\left\{ 2.\cos\left(n.\omega.\frac{\pi}{2}\right) - j.2.\sin\left(n.\omega.\frac{\pi}{2}\right) - 2 \right\} =$$

$$= \frac{1}{-j.n.\omega.\pi}.\left\{ \cos\left(n.\omega.\frac{\pi}{2}\right) - j.\sin\left(n.\omega.\frac{\pi}{2}\right) - 1 \right\}$$

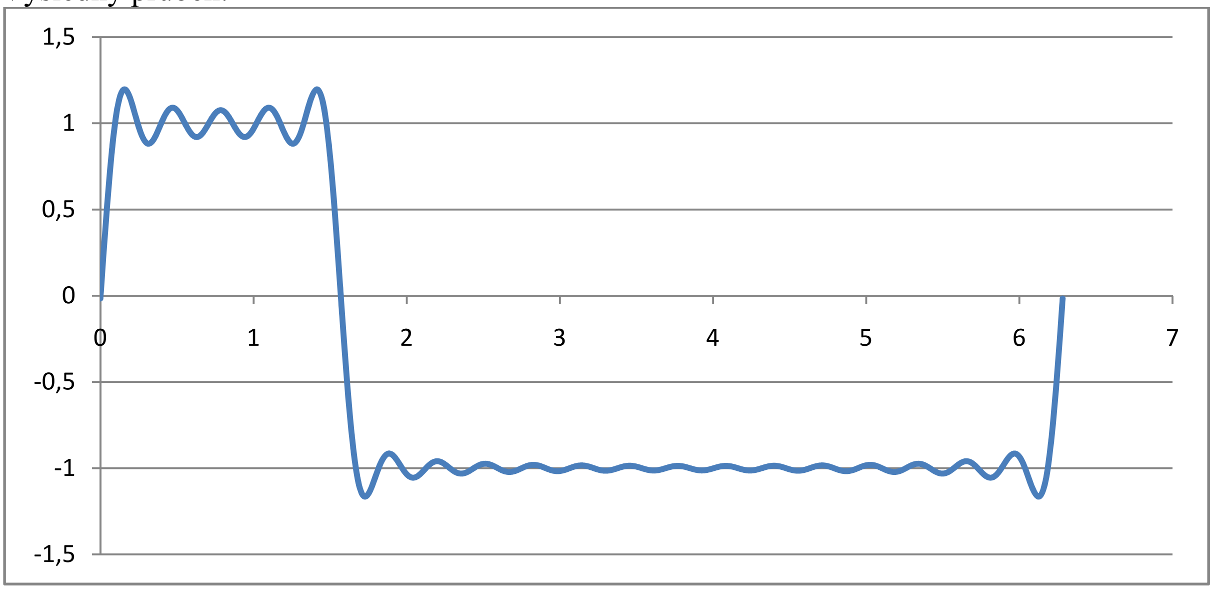
$$s(t) \sim c_0 + \sum_{n=1}^{\infty} \mathrm{Re}\left(c_n.e^{j.n.\omega.t}\right)$$

Grafy:

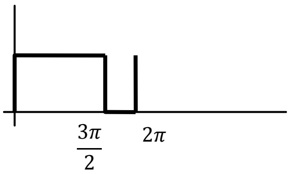
Harmonické složky:



Výsledný průběh:



Příklad č. 5



$\omega = 1, T = 2\pi$

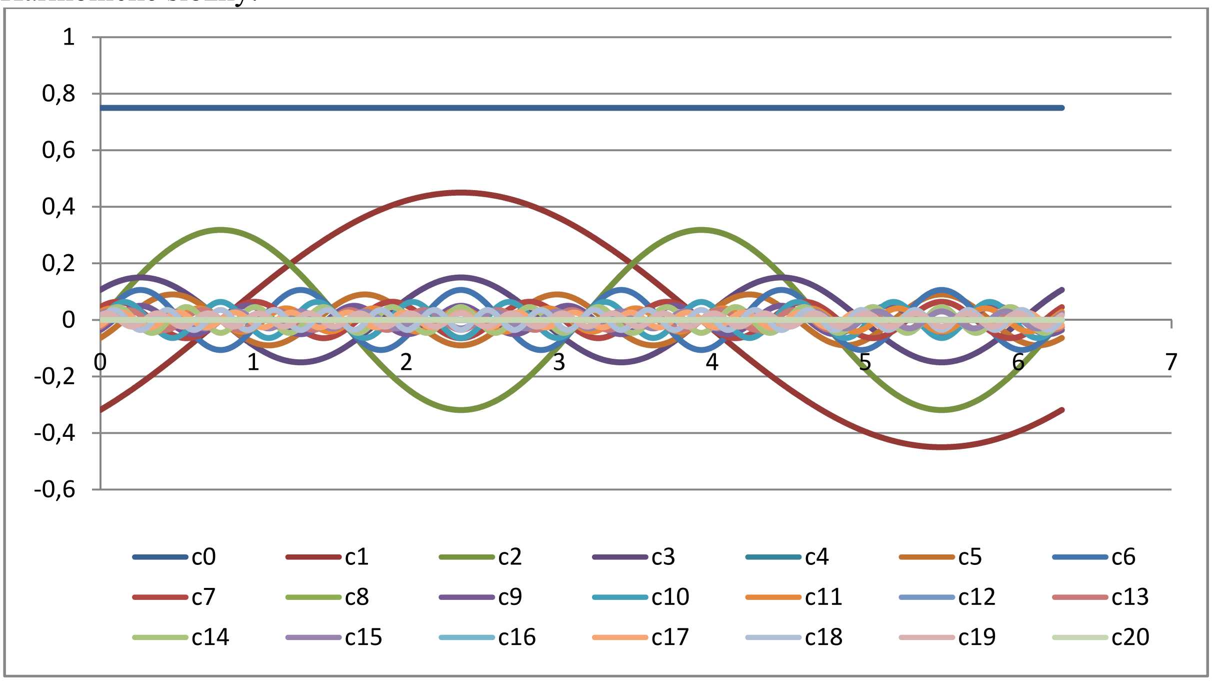
Výpočet:
$s(t) = 1$ pro $t \epsilon \langle 0; \frac{3\pi}{2} \rangle$

$$c_0 = \frac{1}{T} \cdot \int_0^{2\pi} s(t).dt = \frac{1}{T} \cdot \int_0^{\frac{3\pi}{2}} 1.dt = \frac{1}{2\pi} \cdot [t]_0^{\frac{3\pi}{2}} = \frac{1}{2\pi} \cdot \left(\frac{3\pi}{2} - 0\right) = \frac{3}{4}$$

$$c_n = \frac{1}{T} \cdot \int_0^{2\pi} s(t).e^{-j.n.\omega.t}.dt = \frac{1}{T} \cdot \int_0^{\frac{3\pi}{2}} 1.e^{-j.n.\omega.t}.dt = \frac{1}{T} \cdot \left[\frac{e^{-j.n.\omega.t}}{-j.n.\omega}\right]_0^{\frac{3\pi}{2}} =$$

$$= \frac{1}{-j.n.\omega.2\pi} \cdot \left[\cos\left(n.\omega.\frac{3\pi}{2}\right) - j.\sin\left(n.\omega.\frac{3\pi}{2}\right) - 1\right]$$

Grafy:
Harmonické složky:



Výsledný průběh: