s. 728 oppg 6

$$T = 0{,}02 \qquad v(t) = \begin{cases} V & 0 \le t < 0.01 \\ 0 & 0.01 \le t < 0.02 \end{cases}$$

$$\omega = \frac{2\pi}{0{,}02} = 100\pi$$

$$c_n = \frac{1}{0{,}02}\int_0^{0{,}01} V \cdot e^{-j100\pi n t}\,dt = 50\int_0^{\frac{1}{100}} V \cdot e^{-j100\pi n t}\,dt$$

$$= \frac{50V}{-j100\pi n}\Big[e^{-j100\pi n t}\Big]_0^{\frac{1}{100}} = \frac{-V}{j2\pi n}\left[e^{-j\pi n} - 1\right] =$$

$$\frac{Vj}{2\pi n}(\cos n\pi - 1)$$

$$v(t) = \frac{V}{2\pi}\sum_{-\infty}^{\infty} j\,\frac{\cos n\pi - 1}{n}\,e^{j100\pi n t}$$

s. 728 oppg 7

$$T = 8 \qquad f(t) = \begin{cases} 2-t & 0 < t < 4 \\ t-6 & 4 < t < 8 \end{cases}$$

$$\omega = \frac{2\pi}{8} = \frac{\pi}{4}$$

$$c_n = \frac{1}{8}\left(\int_0^4 (2-t)e^{-j\frac{\pi}{4}nt}\,dt + \int_4^8 (t-6)e^{-j\frac{\pi}{4}nt}\,dt\right)$$

T-89

$$= \frac{-(2\cos(n\cdot\pi) + n\sin(n\cdot\pi)\cdot\pi - 2)}{n^2\pi^2} - \frac{(n\cdot\cos(n\pi)\pi - 2\sin(n\pi) + n\pi)}{n^2\pi^2}j + \frac{2\cos(2n\pi) + n\sin(2n\pi)\pi - 2\cos(n\pi) + n\sin(n\pi)}{n^2\pi^2}$$

$$+ \frac{(n\cos(2n\pi)\cdot\pi - 2\sin(2n\pi) + n\cos(n\pi)\pi + 2\sin(n\pi))}{n^2\pi^2}j$$

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

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

$$f(t) = \frac{4}{\pi^2}\sum_{-\infty}^{\infty}\frac{(1 - \cos n\pi)}{n^2}e^{j\frac{\pi}{4}nt}$$

kan omskrives til

$$c_n\left(\cos(\tfrac{\pi}{4}nt) + j\sin(\tfrac{\pi}{4}nt)\right) + c_{-n}\left(\cos(\tfrac{\pi}{4}nt) - j\sin(\tfrac{\pi}{4}nt)\right) =$$

$$= \frac{4(1 - \cos n\pi)}{n^2\pi^2}\left(\cos\tfrac{\pi}{4}nt + j\sin\tfrac{\pi}{4}nt\right) + \frac{4(1 - \cos(-n\pi))}{(-n)^2\pi^2}\left(\cos\tfrac{\pi}{4}nt - j\sin\tfrac{\pi}{4}nt\right)$$

$$= \frac{8}{\pi^2}\frac{(1 - \cos n\pi)}{n^2}\cos\tfrac{\pi}{4}nt \quad \text{dvs.} \quad f(t) = \frac{8}{\pi^2}\sum_{n=1}^{\infty}\frac{(1 - \cos n\pi)}{n^2}\cos\left(\frac{n\pi}{4}t\right)$$