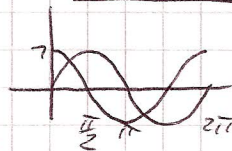


①  $\sin(\omega t) \rightarrow ?$

$\rightarrow \sin(\omega t) = \cos(\omega t - t_0)$



$\cos(\omega t - t_0) \rightarrow F(\cos(\omega)) \cdot e^{-j\omega t_0}$

$$= \pi (\delta(\omega - \omega_0) + \delta(\omega + \omega_0)) \cdot e^{-j\omega t_0} \quad \left. \begin{array}{l} t_0 = \frac{\pi}{2\omega_0} \\ t_0 = \frac{\pi}{2\omega_0} \end{array} \right\}$$

$$= \pi (\delta(\omega - \omega_0) + \delta(\omega + \omega_0)) \left( \cos(\omega_0 \frac{\pi}{2\omega_0}) - j \sin(\omega_0 \frac{\pi}{2\omega_0}) \right)$$

$$= \pi \delta(\omega - \omega_0) \left[ \underbrace{\cos(\omega_0 \frac{\pi}{2\omega_0})}_{=1} - j \underbrace{\sin(\omega_0 \frac{\pi}{2\omega_0})}_{=1} \right] +$$

$$\pi \delta(\omega + \omega_0) \left[ \underbrace{\cos(-\omega_0 \frac{\pi}{2\omega_0})}_{=1} - j \underbrace{\sin(-\omega_0 \frac{\pi}{2\omega_0})}_{=-1} \right] = -j\pi (\delta(\omega - \omega_0) - \delta(\omega + \omega_0)) \stackrel{!}{=} F(\sin(\omega t)) \checkmark$$

③  $g(t) = \text{rect}(t) * \text{rect}(t)$

$\rightarrow F(g(t)) = F(t) \cdot F(t)$

$\text{rect}(t) \rightarrow \text{sinc}(t)$

$F(g(t)) = \text{sinc}^2(t)$

$$f(F(g(t))) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \text{sinc}^2(t) \cdot e^{-j\omega t} dt$$

$$\swarrow$$

$$A(t)$$

das ist ja geschnitten...

⑤ Ges:  $F(\Lambda(t))$

Lös:

$\Lambda(t) = \pi(t) * \pi(t)$

$$\left. \begin{array}{l} \Lambda(t) \rightarrow \text{sinc}^2(t) \\ \pi(t) \rightarrow \text{sinc}(t) \end{array} \right\} \text{sinc}^2 = \pi * \pi$$

$F(\Lambda(t)) = F(\pi(t) * \pi(t))$

$= F(\pi(t)) \cdot F(\pi(t))$

$$= \text{sinc}(t) \cdot \text{sinc}(t) = \text{sinc}^2(t) \checkmark$$

②, ④, ⑥ fehlt