Aufgabe 3.4

a)

$$U_{eff}^2 = \frac{1}{t_P} \int_{t_P} U_p^2(t)\, dt$$

$$= \frac{1}{1\,ms} \left[\int_{-0{,}25\,ms}^{0{,}25\,ms} (4V)^2\, dt + \int_{0{,}25\,ms}^{0{,}75\,ms} (-4V)^2\, dt \right]$$

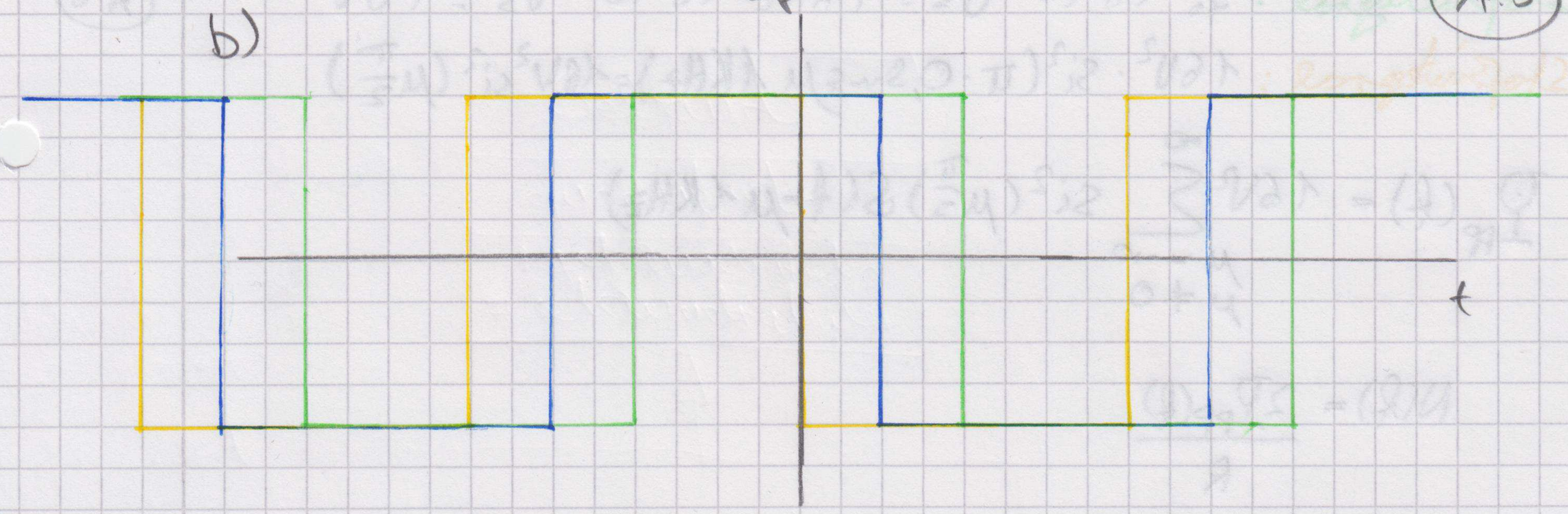
$$= \frac{1}{1\,ms} \left[16V^2 t \right]_{-0{,}25\,ms}^{0{,}75\,ms} = 16V^2$$

$$P = \frac{U_{eff}^2}{R} = \frac{16V^2}{75\Omega} = \underline{0{,}213W}$$

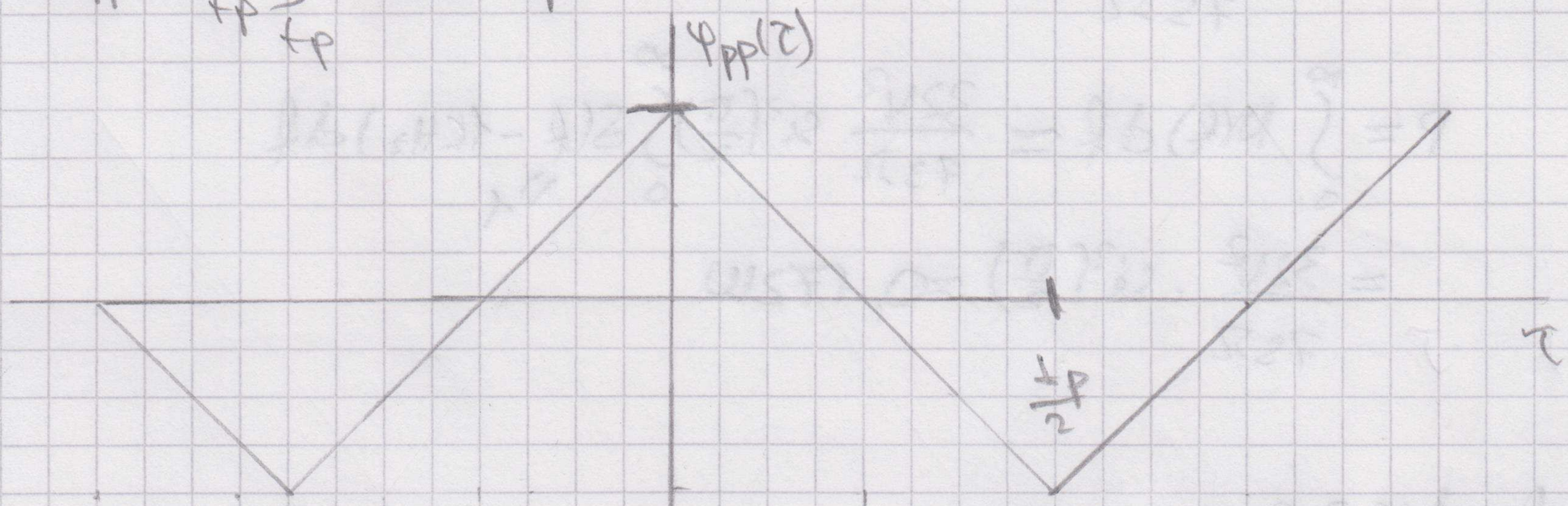
$$U = \frac{1}{t_P} \int_{t_P} u_p(t)\, dt = 0V \Rightarrow P = 0W$$

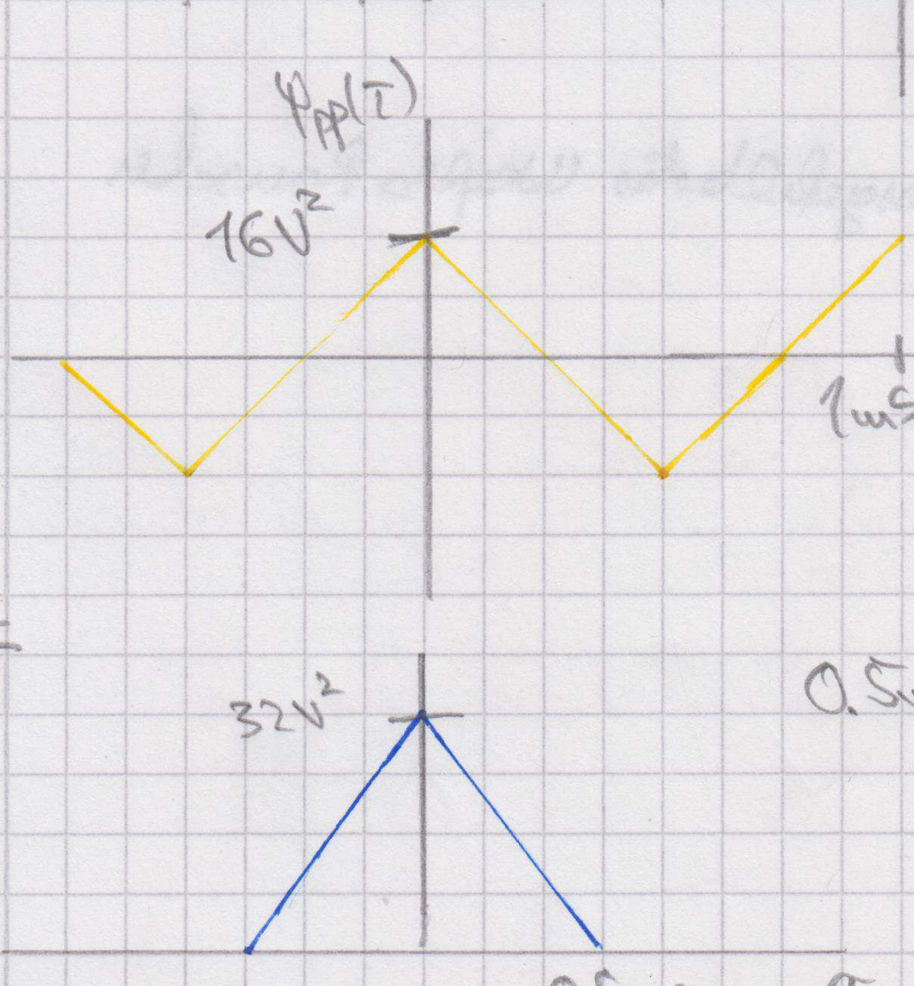
A.S

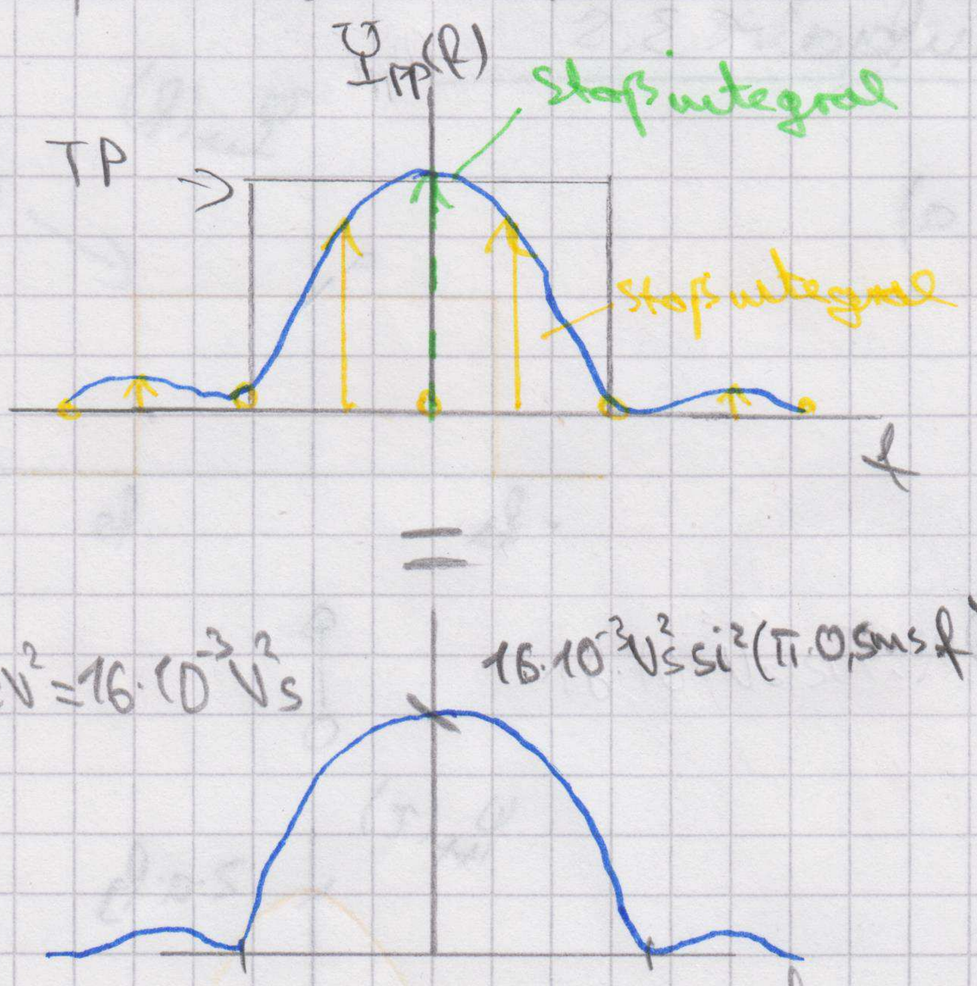
b)



$$\varphi_{pp} = \frac{1}{t_p} \int_{t_p} u_p(t)\, u_p(t+\tau)\, dt$$

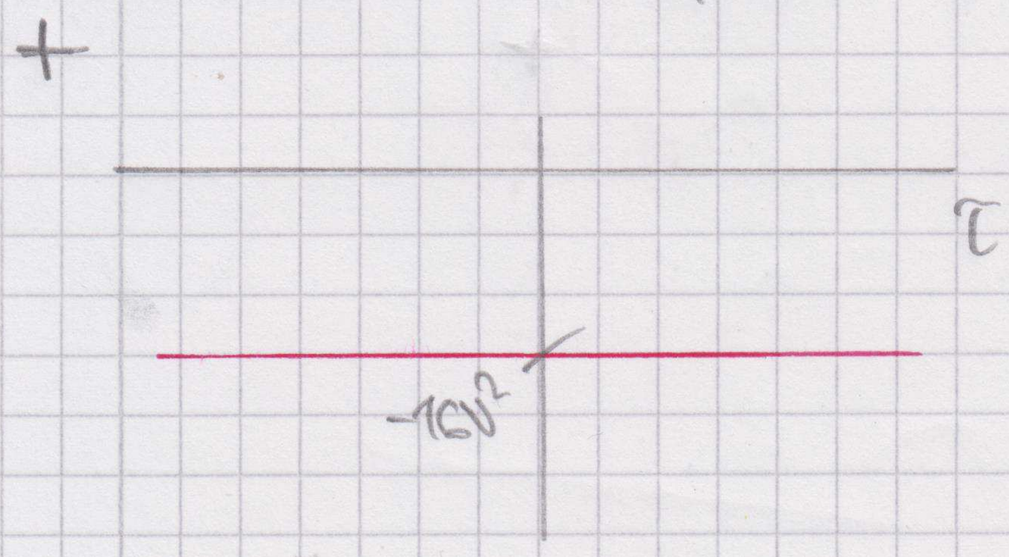


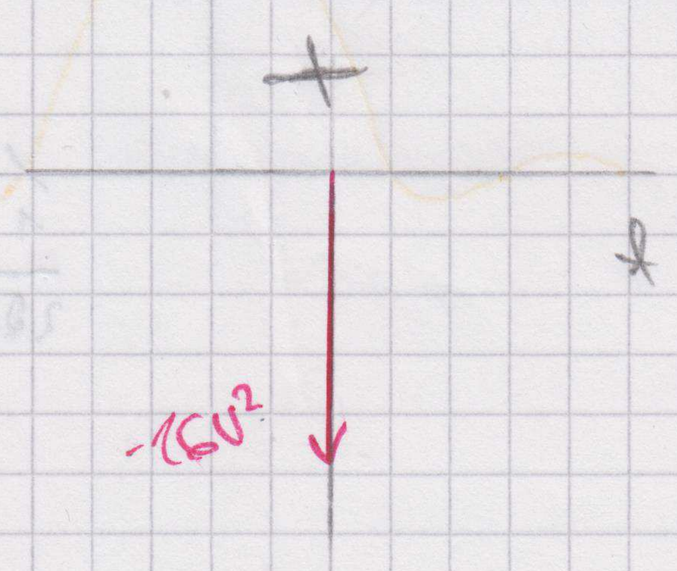




=

$0,5ms \cdot 32V^2 = 16 \cdot 10^{-3} V^2 s$





Stoßintegral: $f_0 \cdot 16\,10^{-3}\,V^2s = 1\,kHz \cdot 16 \cdot 10^{-3}\,V^2s = 16\,V^2$

Stoßintegral: $16V^2 \cdot Si^2(\pi \cdot 0{,}5ms\mu\,1kHz) = 16V^2\,Si^2(\mu\frac{\pi}{2})$

$$\underline{V}_{AP}(f) = 16V^2 \sum_{\substack{\mu=-\infty \\ \mu\neq 0}}^{\infty} Si^2(\mu\tfrac{\pi}{2})\,\delta(f-\mu\,1kHz)$$

$$N(f) = \frac{2\underline{V}_{PP}(f)}{R}$$

d) $\underline{V}_{TP}(f) = 16V \cdot \left[Si^2(-\frac{\pi}{2})\,\delta(f+1kHz) + Si^2(\frac{\pi}{2})\,\delta(f-1kHz)\right]$

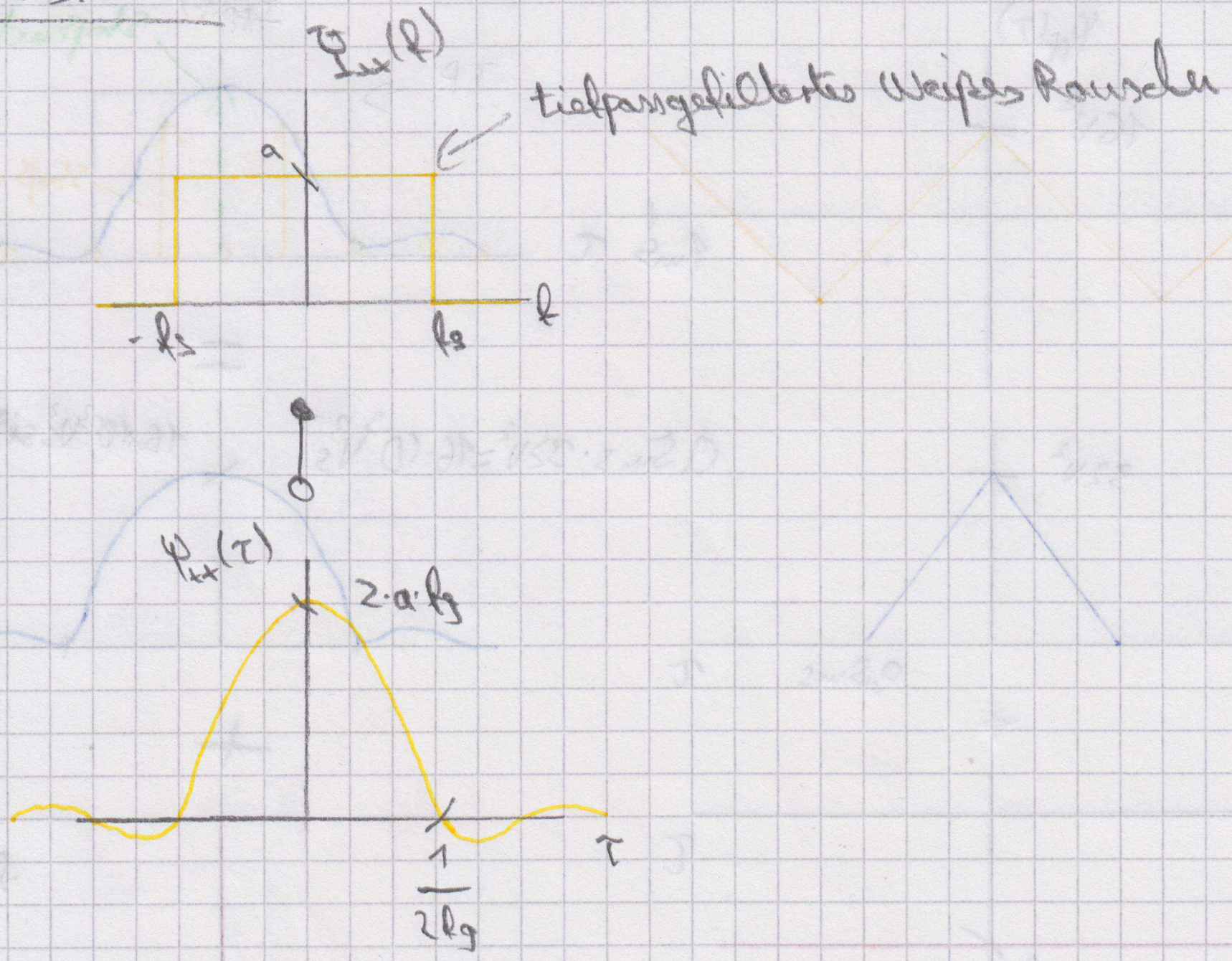
$$N_{TP}(f) = \frac{32V^2}{75\Omega}\,Si^2(\frac{\pi}{2})\,\delta(f-1kHz)$$

$$P = \int_0^\infty N(f)\,df = \frac{32V^2}{75\Omega}\,Si^2(\tfrac{\pi}{2}) \int_0^\infty \delta(f-1kHz)\,df$$

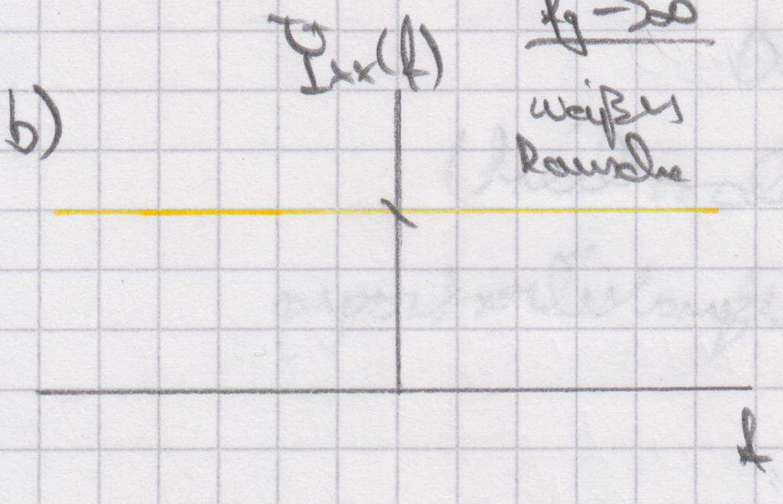
$$= \frac{32V^2}{75\Omega} \cdot Si^2(\tfrac{\pi}{2}) = 0{,}172W$$

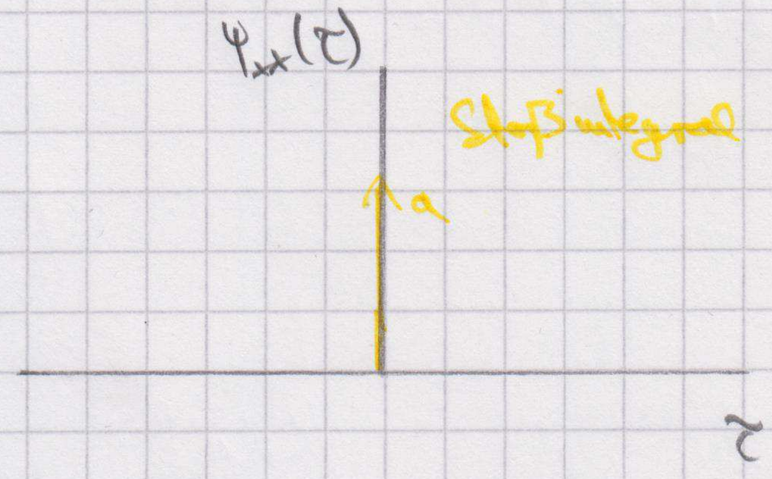
Aufgabe 3.5

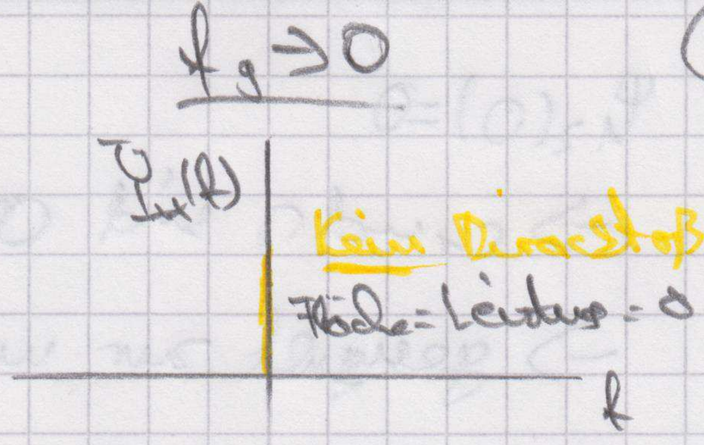
a)

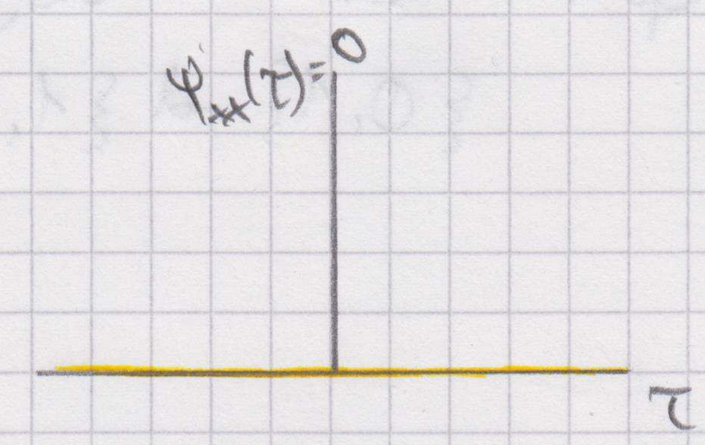


b)



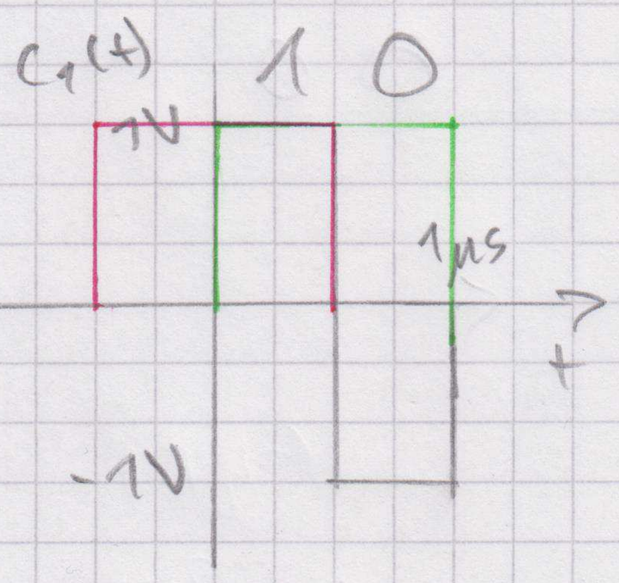


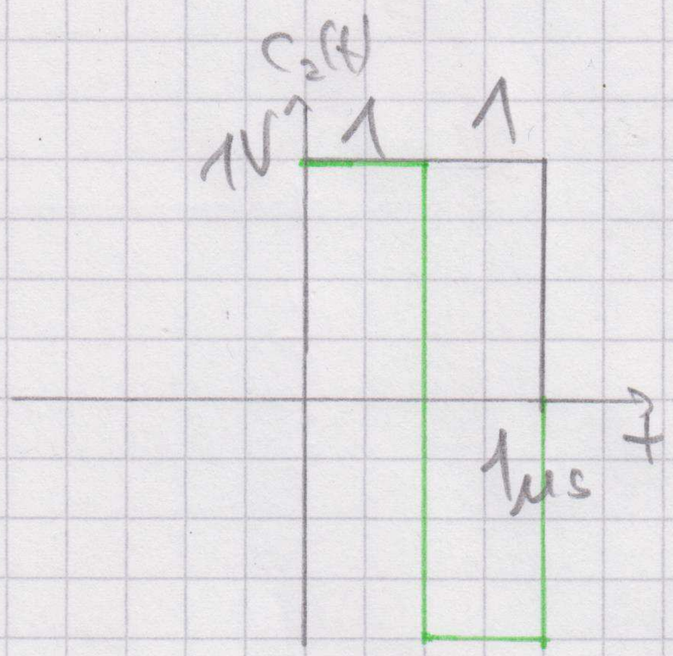




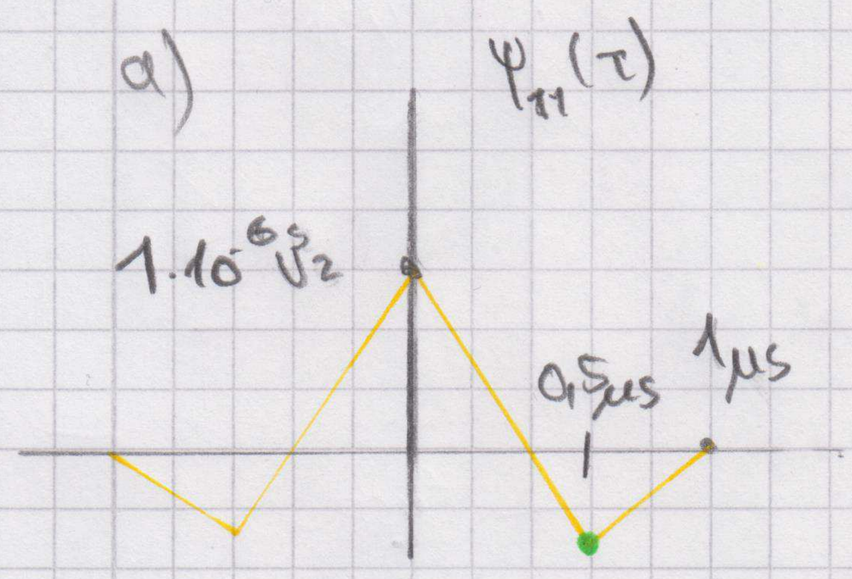
c) - Grüne Ränder im Signal -

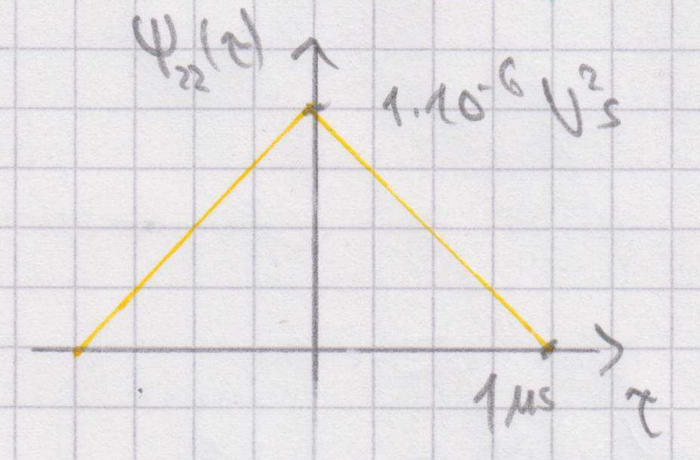
Aufgabe 3.6



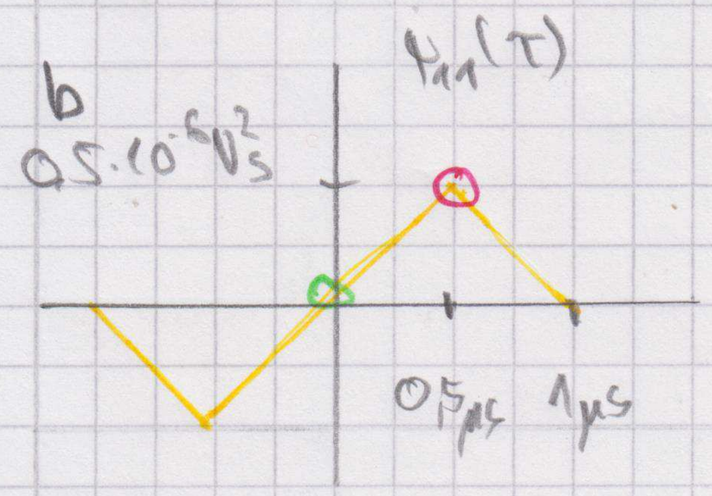


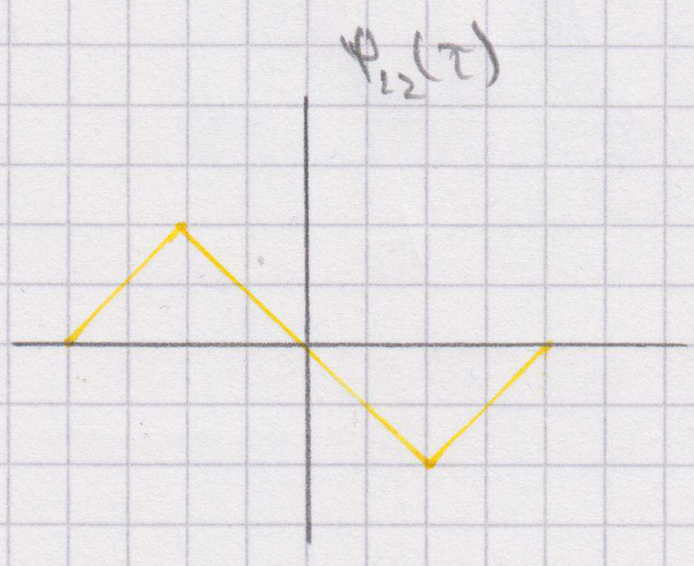
a)





b





c) $\varphi_{12}(0) = 0$ $\varphi_{21}(0) = 0$

$\Rightarrow c_1$ und c_2 sind Orthogonal (unkorreliert)

$\Rightarrow$ geeignet zur unabhängigen Signalübertragung

Bsp für nicht Orthogonale Kodes:

$\{0,1\}$ und $\{1,0\}$