

LÖSUNGEN BASISBANDÜBERTRAGUNG

Aufgabe 1

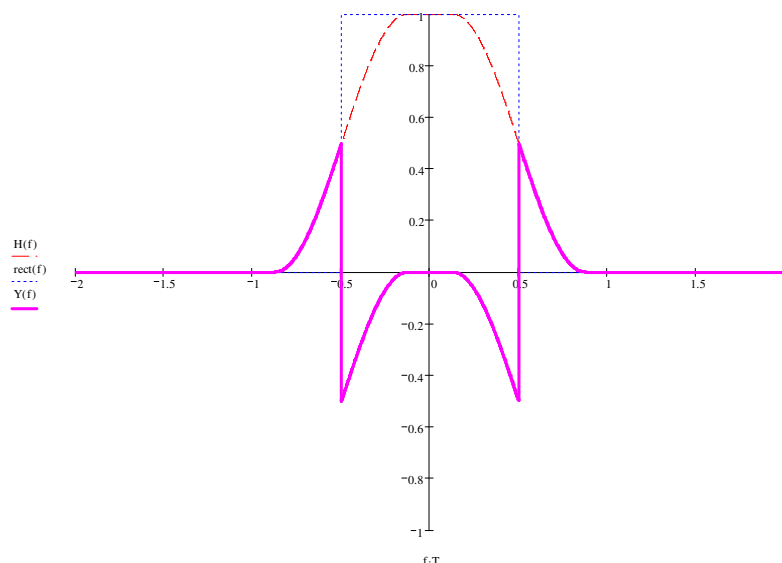
a)

Raised-Cosine:
$$H(f) = \begin{cases} 1, & |f| \leq \frac{1-r}{2T} \\ \frac{1}{2} \left\{ 1 - \sin \left[\frac{\pi \cdot T}{r} \cdot \left(|f| - \frac{1}{2T} \right) \right] \right\}, & \frac{1-r}{2T} \leq |f| \leq \frac{1+r}{2T} \\ 0, & |f| \geq \frac{1+r}{2T} \end{cases}$$

$$\Rightarrow Y(f) = H(f) - \text{rect}(f) = \begin{cases} H(f) - 1, & |f| \leq \frac{1}{2T} \\ H(f), & |f| > \frac{1}{2T} \end{cases}$$

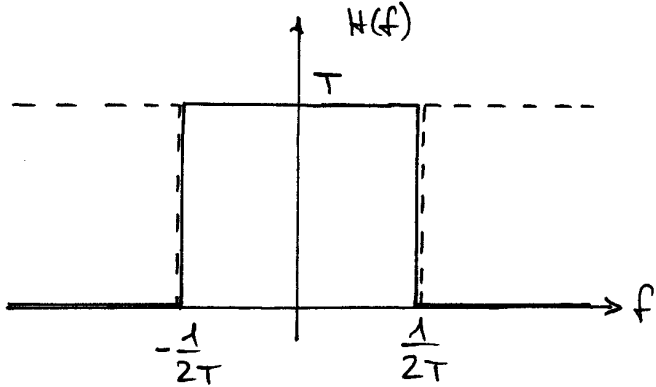
$$= \begin{cases} 0, & |f| \leq \frac{1-r}{2T} \\ \frac{1}{2} \cdot \left\{ -1 - \sin \left[\frac{\pi \cdot T}{r} \cdot \left(|f| - \frac{1}{2T} \right) \right] \right\}, & \frac{1-r}{2T} \leq |f| \leq \frac{1}{2T} \\ \frac{1}{2} \cdot \left\{ 1 - \sin \left[\frac{\pi \cdot T}{r} \cdot \left(|f| - \frac{1}{2T} \right) \right] \right\}, & \frac{1}{2T} \leq |f| \leq \frac{1+r}{2T} \\ 0, & |f| \geq \frac{1+r}{2T} \end{cases}$$

b)

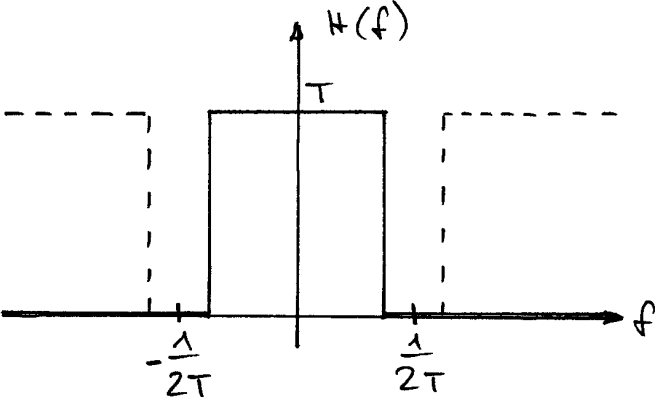


Aufgabe 2

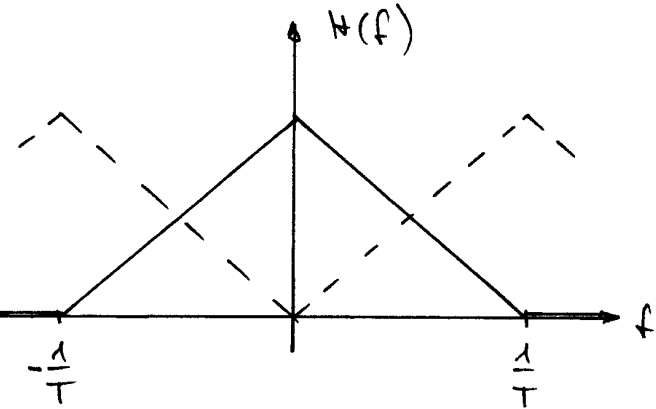
a)



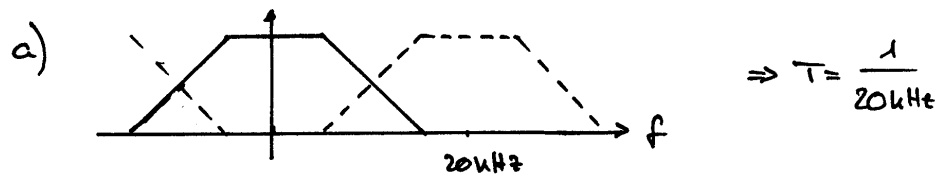
b)



c)



Aufgabe 3



$$\underline{R = 20 \text{ kbit/s}}$$

b) $B = 15 \text{ kHz}, R = 20 \text{ kbit/s}$

$$\Rightarrow \frac{R}{B} = 1,33 \frac{\text{bit}}{\text{s} \cdot \text{Hz}}$$