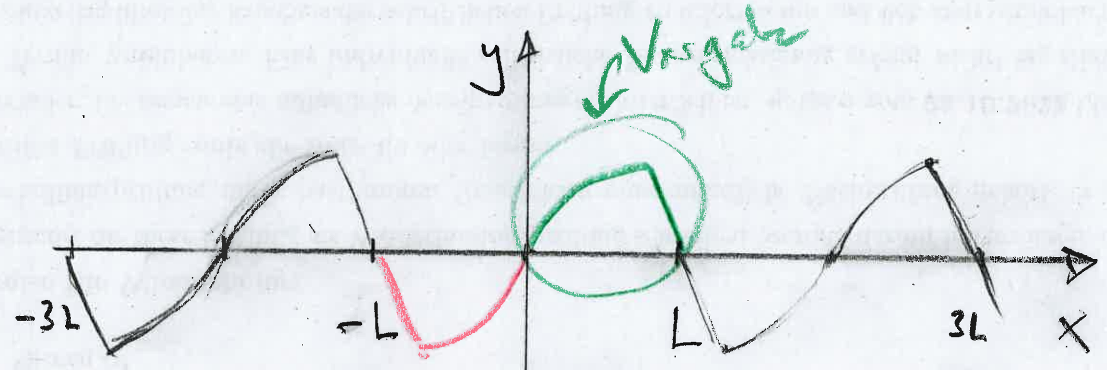
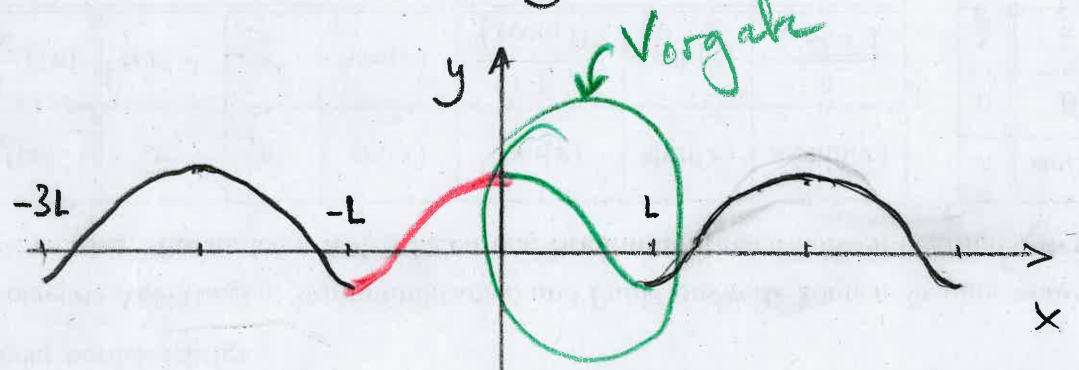
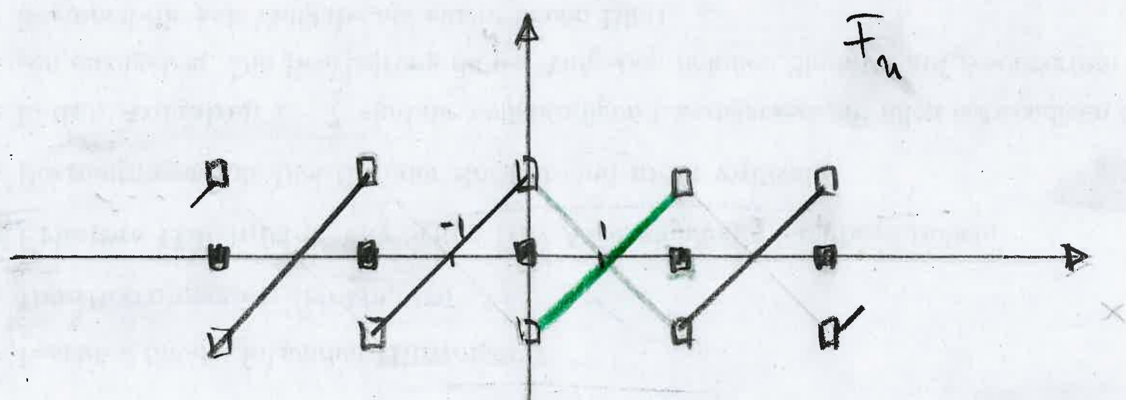
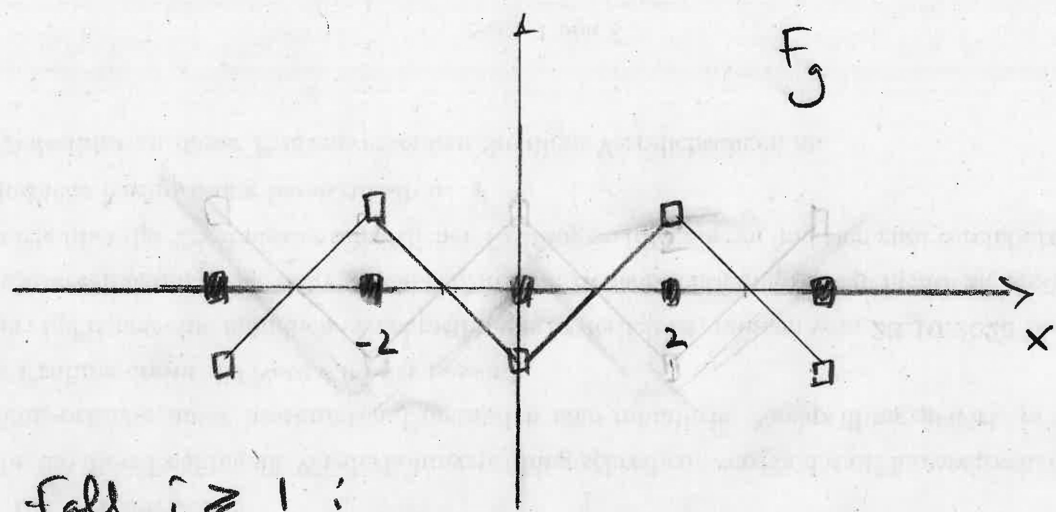
Ungerade Fortsetzung:



Gerade Fortsetzung







NR: Fall $j \geq 1$:

NR: $f_j = \int_0^2 (x-1) \cos\left(\frac{j\pi}{2} x\right) dx$

$$= \left[(x-1) \frac{1}{j\pi/2} \sin\left(\frac{j\pi}{2} x\right)\right]_0^2 - \int_0^2 1 \cdot \frac{1}{j\pi/2} \sin\left(\frac{j\pi}{2} x\right) dx$$

$$= -\left[\frac{1}{j\pi/2} \frac{1}{j\pi/2} \left(-\cos\left(\frac{j\pi}{2} x\right)\right)\right]_0^2$$

$$= \frac{4}{j^2\pi^2}\left((-1)^j - 1\right) =$$

$$= \begin{cases} -\frac{8}{j^2\pi^2} & \text{falls } j \text{ ungerade} \\ 0 & \text{falls } j \text{ gerade} \end{cases}$$

Beispiel

$$u_{xy} = 0$$

$\Rightarrow$ u_x konstant in y

$$\Rightarrow \quad u_x = f(x)$$

$$\Rightarrow \quad u = F(x) + c(y)$$

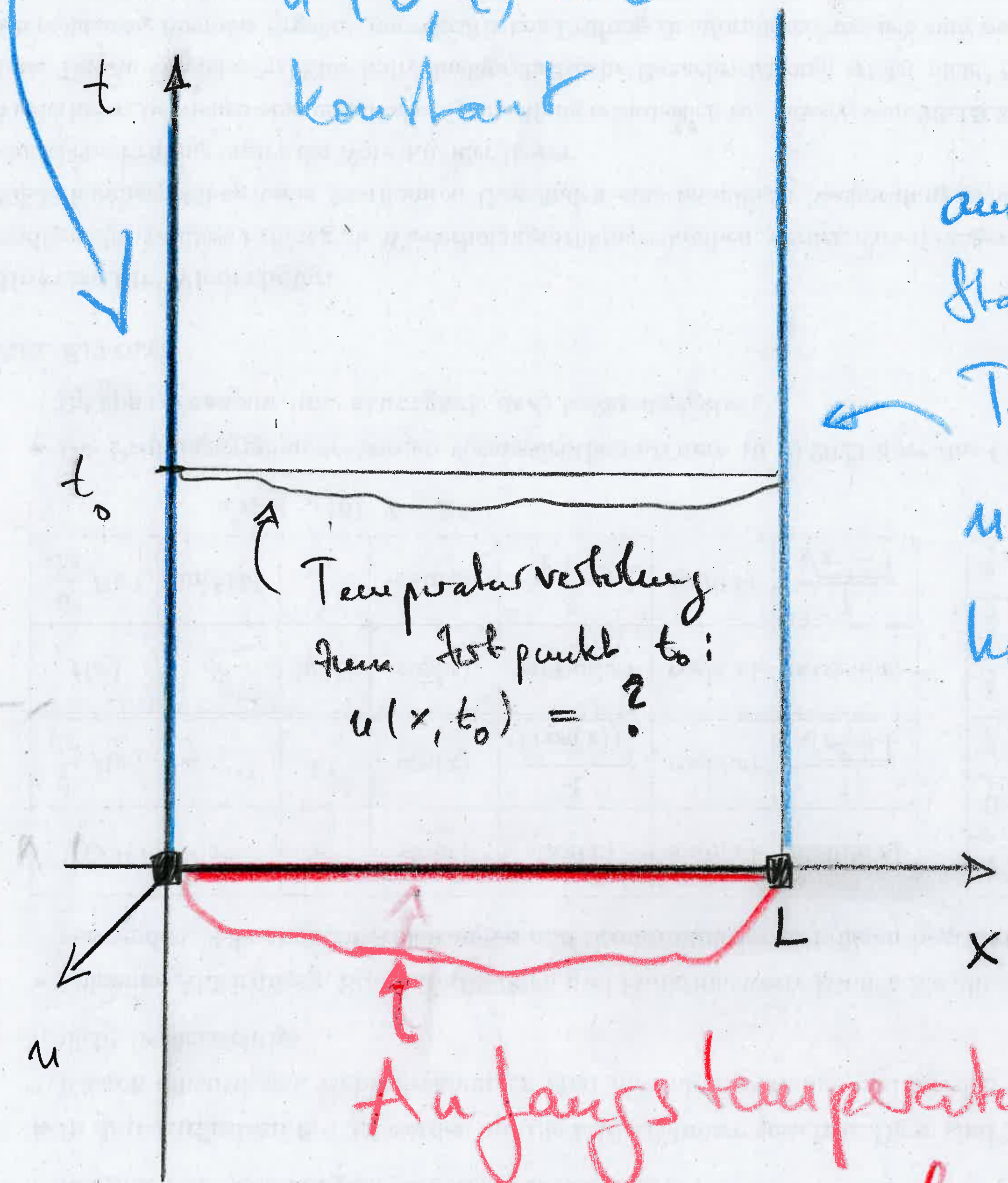
Also: Lösungen sind alle Funktionen der Form

$$u(x,y) = a(x) + b(y)$$

mit $a(x)$, $b(y)$ diff'bar.

Das sind Wellen.

am linken Stabende Temperatur $u(0,t) = 0$ konstant



am rechten Stabende Temperatur $u(L,t) = 0$ konstant

Temperaturverteilung zum Zeitpunkt t_0: $u(x,t_0) = ?$

Anfangstemperatur-Verteilung $f(x) = u(x,\underset{t=0}{0})$ vorgegeben