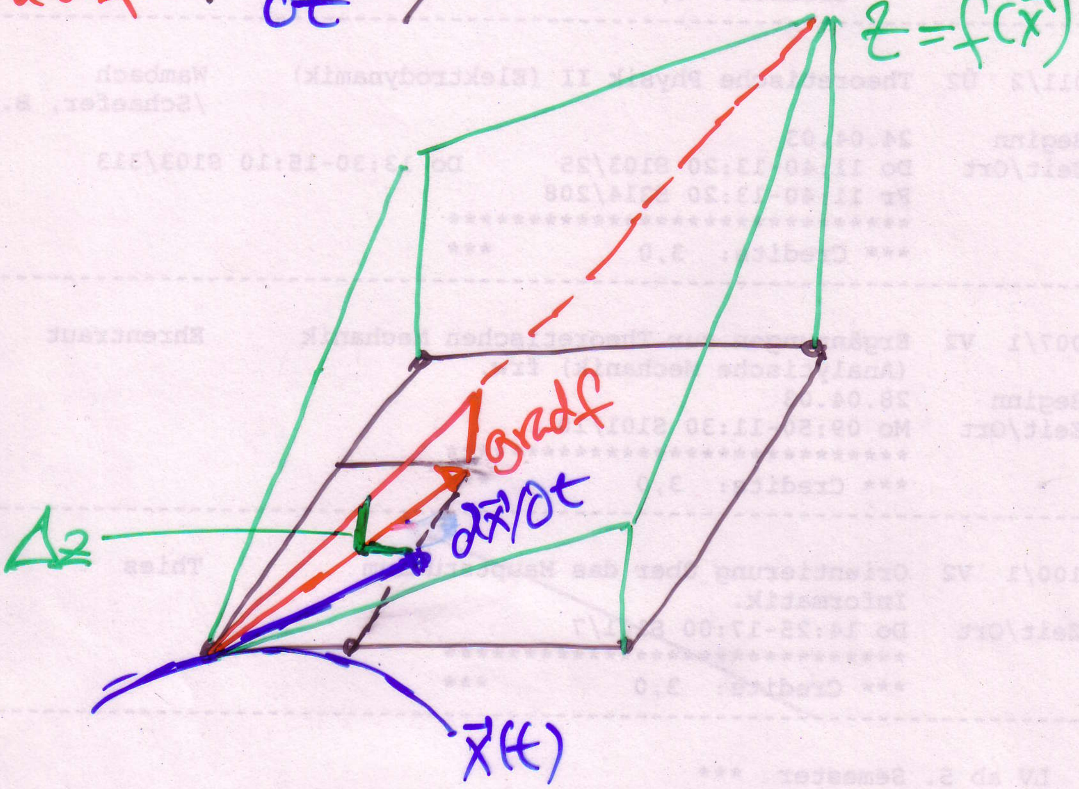
$$\left\langle \mathrm{grad} f \,\middle|\, \frac{\partial x}{\partial t} \right\rangle$$



Beweis $\quad f(\vec{x}) = z$

$$\frac{\Delta z}{\Delta t} = \sum_{i=1}^{n} \frac{\partial z}{\partial x_i} \frac{\Delta x_i}{\Delta t} + \frac{R(\Delta \vec{x})\, \|\Delta \vec{x}\|}{\|\Delta \vec{x}\| \;\Delta t}$$

$$\to \sum_{i=1}^{n} \frac{\partial z}{\partial x_i} \frac{\partial x_i}{\partial t} + 0$$

$$\frac{R(\Delta \vec{x})}{\|\Delta \vec{x}\|} \to 0 \qquad \frac{\|\Delta \vec{x}\|}{|\Delta t|} \to \left\| \frac{\partial \vec{x}}{\partial t} \right\| < \infty$$

1926 (5)

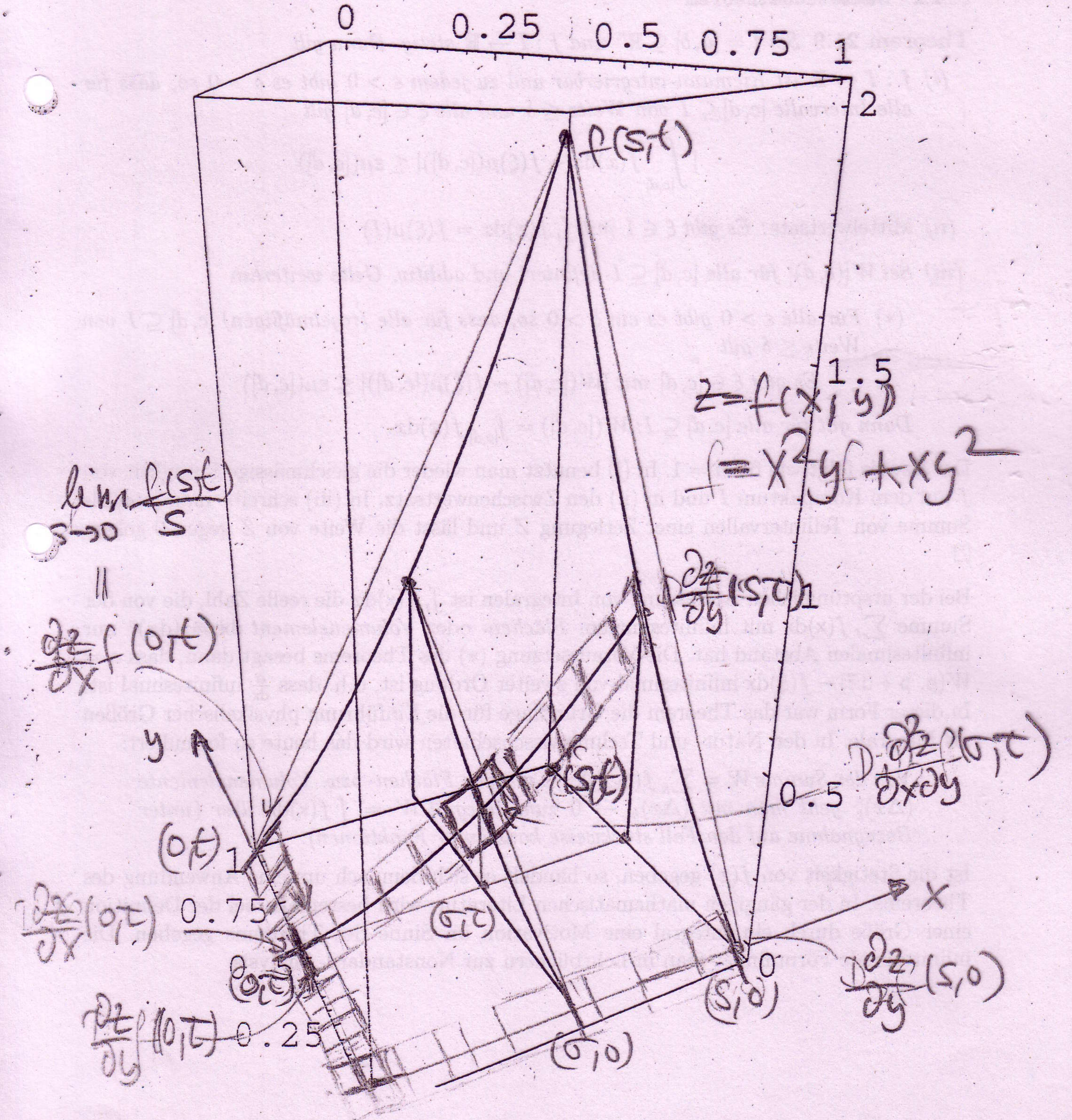
oBdA $n=2$, $p=0$ $\quad f(x,0)=f(0,y)=0$

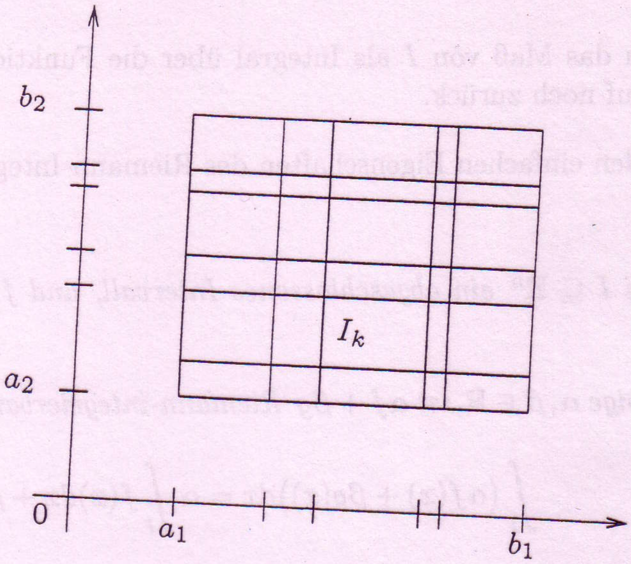
$\frac{\partial z}{\partial x}, \frac{\partial^2 z}{\partial x \partial y}$ ex lokal stetig, $\frac{\partial^2 z}{\partial x \partial y} \to 0 \quad (x,y)\to 0$

$$\frac{1}{t}\frac{f(s,t)}{s} = \frac{1}{s}\frac{f(s,t)}{t} = \frac{1}{s}\frac{\partial z}{\partial y}(s,\tau)$$

$$= \frac{\partial^2 z}{\partial x \partial y}(\sigma,\tau) \to 0 \quad \text{für } (s,t)\to 0$$

also $(\sigma,\tau)\to 0$





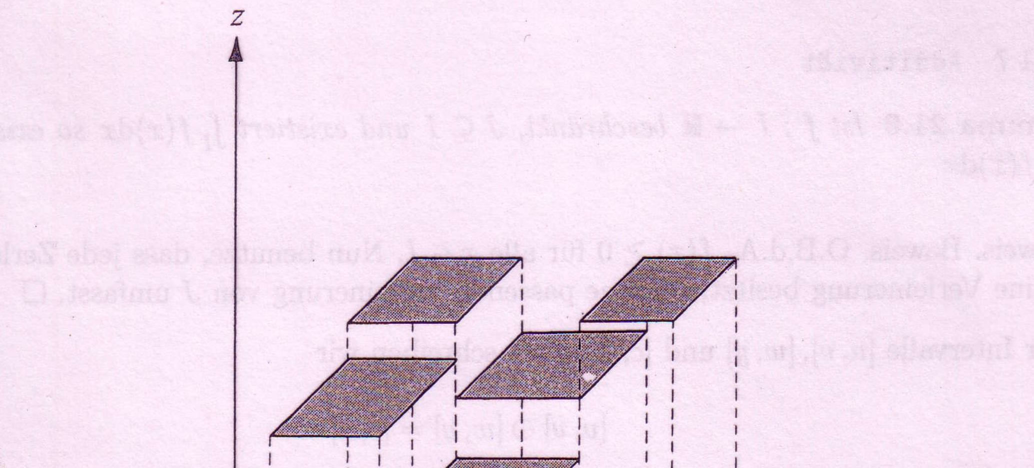


FIGURE 2.8 *The graph of a step function defined over a rectangle R.*

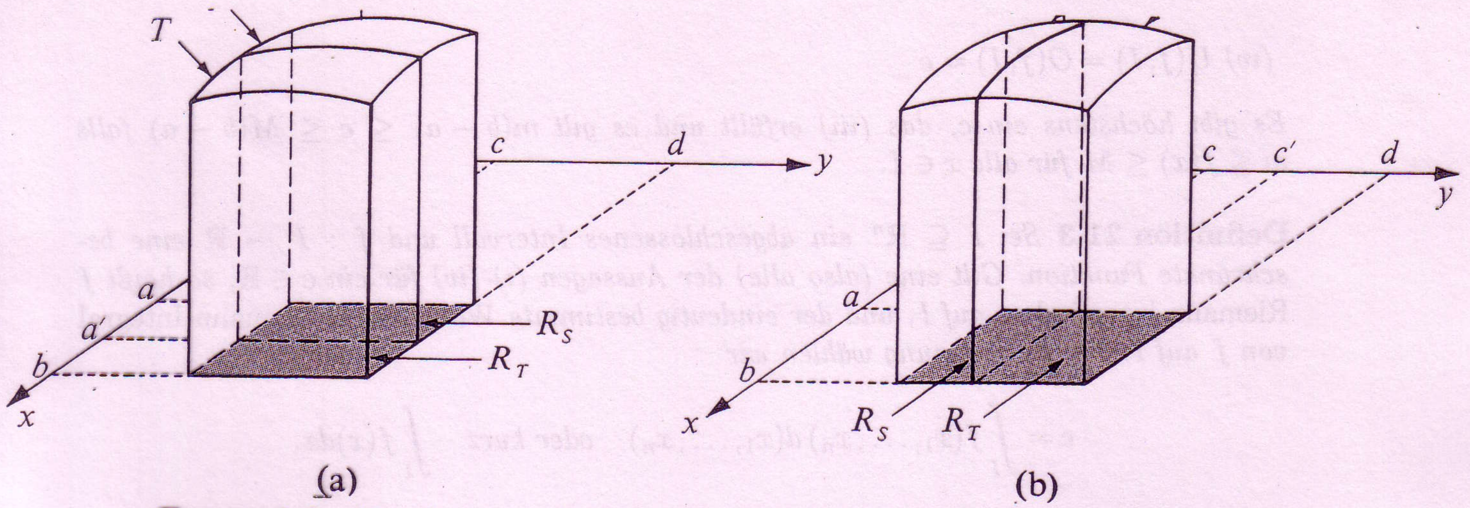


FIGURE 2.5 *Verification of the additive property* $V(S \cup T) = V(S) + V(T)$.

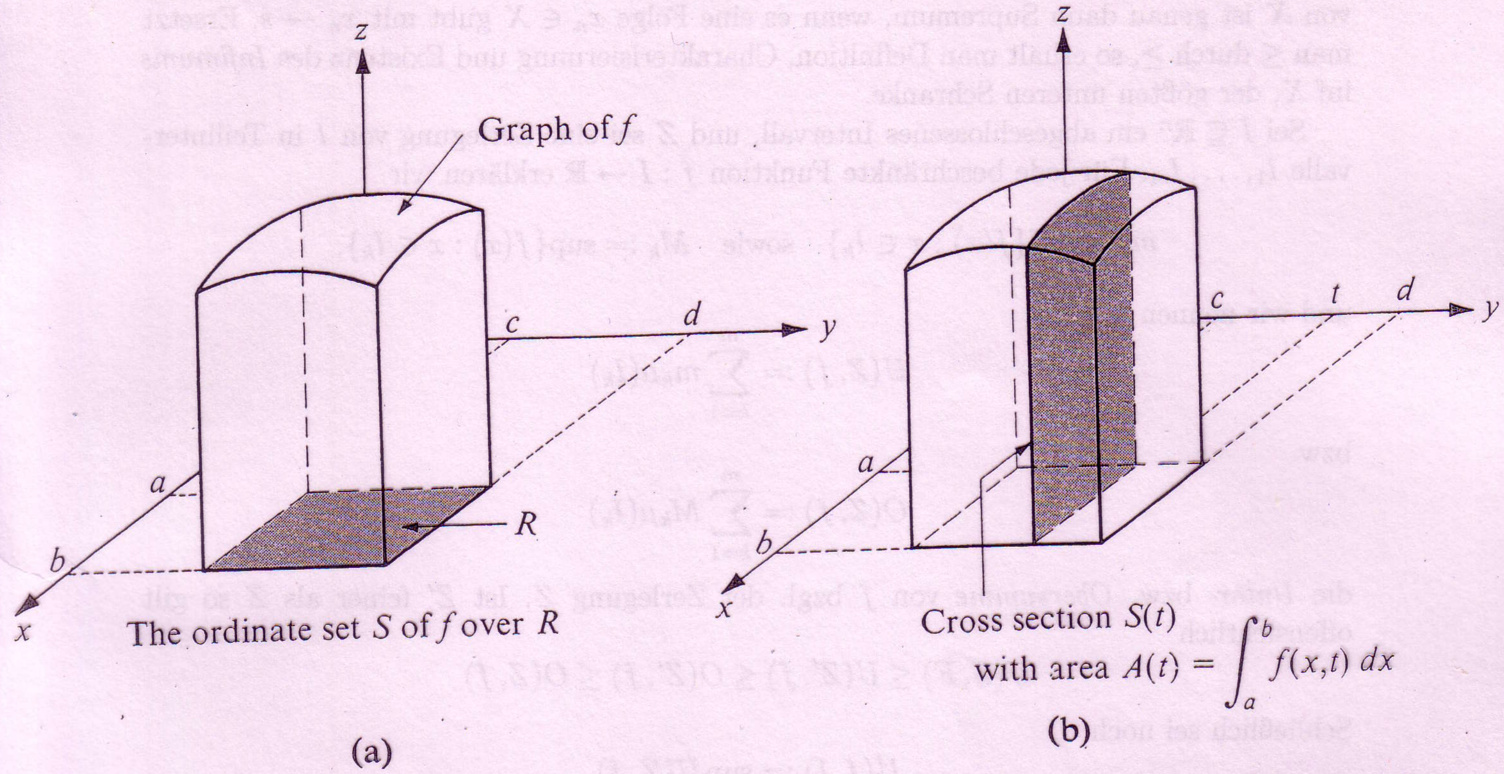


Figure 2.4 *The volume of S is the integral of the cross-sectional area:* $V(S) = \int_c^d A(t)\,dt$.