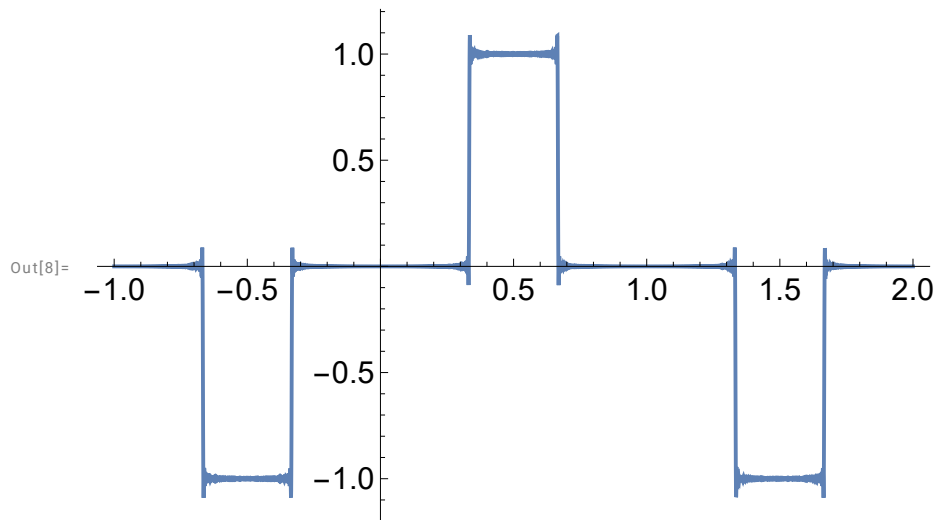# Lineare partielle Differentialgleichungen 2. Ordnung
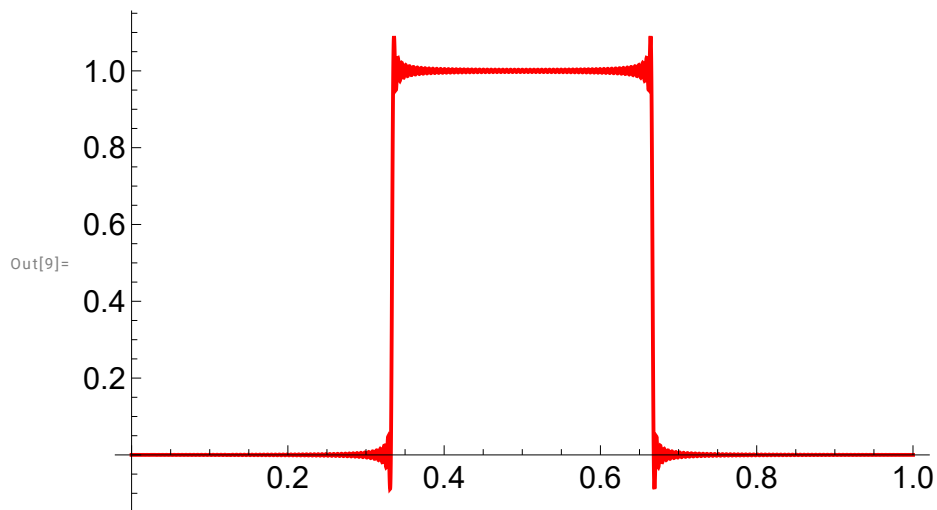
Parabolisch: Lösung mit Fourier

In[7]:= $yx = \dfrac{4}{\pi} \displaystyle\sum_{n=0}^{200} \dfrac{1}{2\,n+1} \, \mathrm{Cos}\left[\dfrac{2\,n+1}{3}\,\pi\right] \mathrm{Sin}[\,(2\,n+1)\,\pi\,x\,]\,;$

In[8]:= `yxplot = Plot[yx, {x, -1, 2}, PlotRange → All, PlotPoints → 100, BaseStyle → FontSize → 16]`
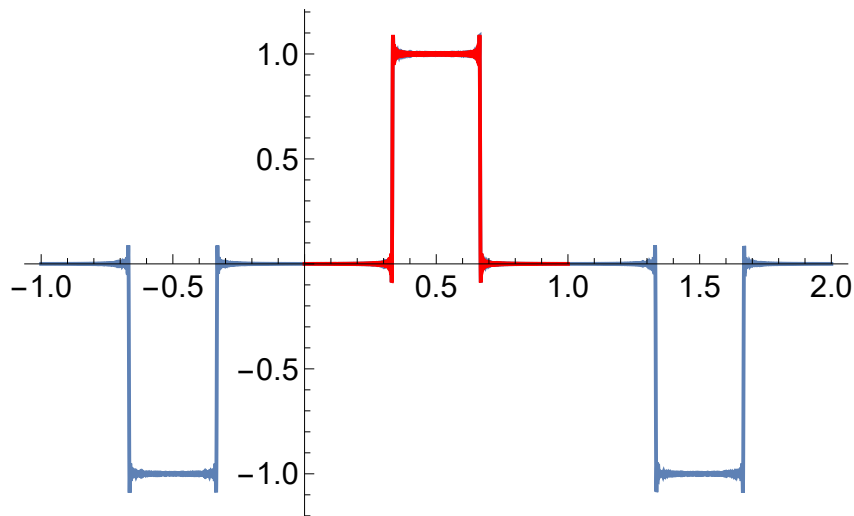
Out[8]=

In[9]:= `yx01plot = Plot[yx, {x, 0, 1}, PlotRange → All,`
`    PlotPoints → 100, BaseStyle → FontSize → 16, PlotStyle → Red]`

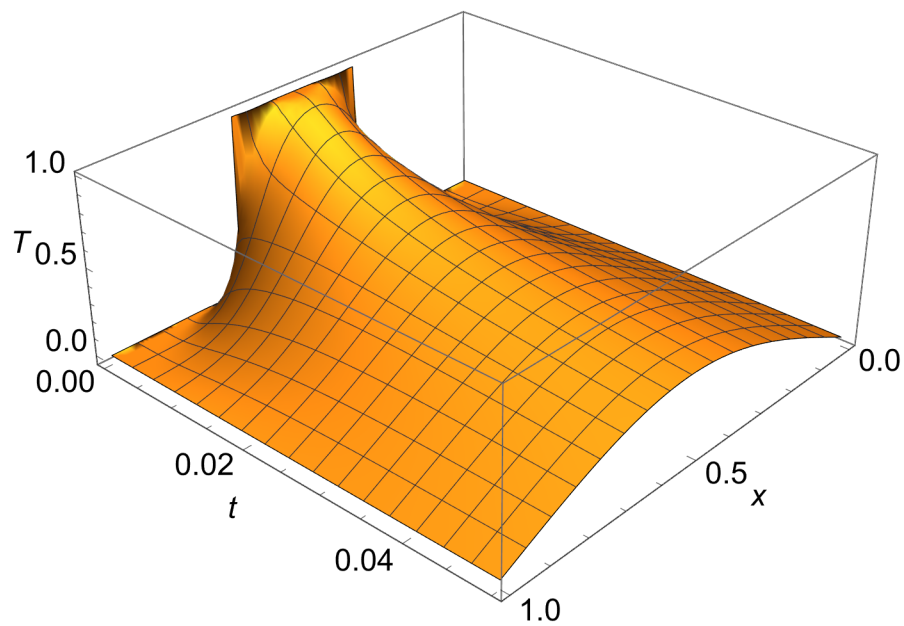Out[9]=

In[10]:= **Show[yxplot, yx01plot]**

Out[10]=

In[11]:= $uxt = \dfrac{4}{\pi} \sum_{n=0}^{200} \dfrac{1}{2n+1} \operatorname{Cos}\left[\dfrac{2n+1}{3}\pi\right] \operatorname{Sin}[(2n+1)\pi x] e^{-(2n+1)^2 \pi^2 t};$
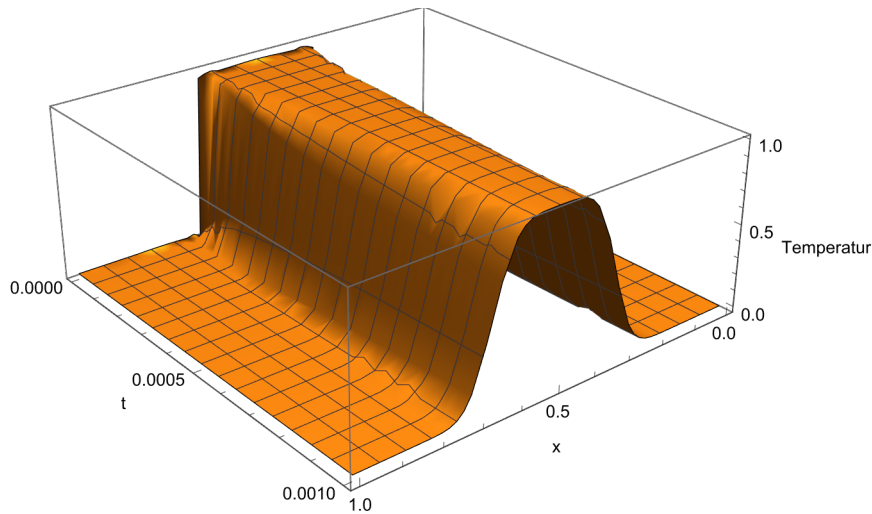
In[12]:= **Plot3D[Min[1, uxt], {x, 0, 1}, {t, 0, .05}, PlotRange → All, PlotPoints → 50, AxesLabel → {x, t, T}, BaseStyle → FontSize → 16]**

Out[12]=

In[13]:= **Plot3D[uxt, {x, 0, 1}, {t, 0, .001},**
PlotRange → All, AxesLabel → {"x", "t", "Temperatur"}]

Out[13]=

In[14]:= **Plot[Table[uxt /. t → tt, {tt, {0.001, 0.005, 0.02, 0.06, 0.2}}] // Evaluate, {x, 0, 1},**
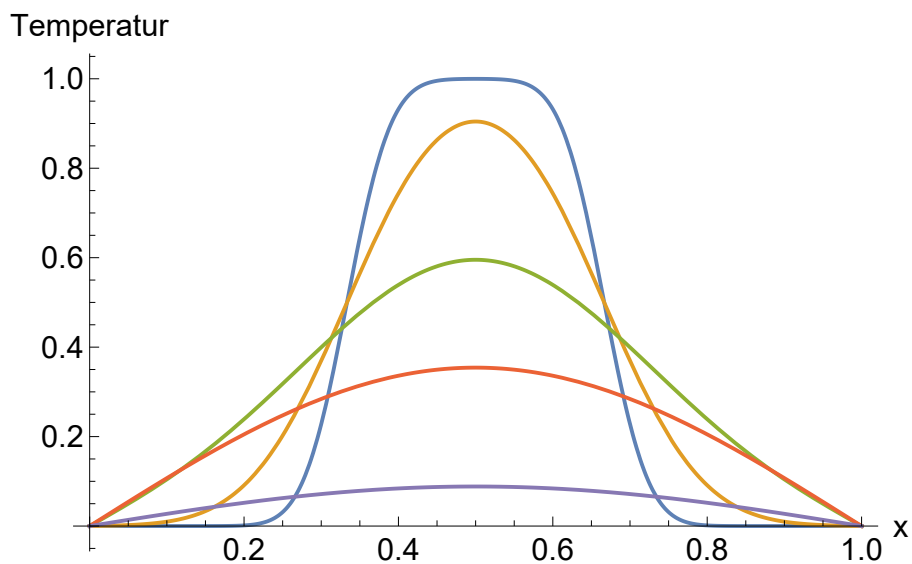**PlotRange → All, AxesLabel → {"x", "Temperatur"}, BaseStyle → FontSize → 16]**

⋯ General: $\frac{1}{267}$ 2.70963 × 10^{-306} (−1) is too small to represent as a normalized machine number; precision may be lost. ⓘ

⋯ General: Exp[−714.174] is too small to represent as a normalized machine number; precision may be lost. ⓘ

⋯ General: Exp[−724.834] is too small to represent as a normalized machine number; precision may be lost. ⓘ

⋯ General: Further output of General::munfl will be suppressed during this calculation. ⓘ

Out[14]=

In[15]:= `Plot[Table[uxt /. x → xx, {xx, {0.02, 0.1, 0.2, 0.3, 0.34, 0.5}}] // Evaluate, {t, 0, .2},`
        `PlotRange → All, AxesLabel → {"t", "Temperatur"}, BaseStyle → FontSize → 16]`

Out[15]=