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"About an example suggested by H. Weinberger."

ABSTRACT:

We consider the probabilistic solutions of the heat equation $u_{x^2} = u_{x^1x^1} + f$ in $D$, where $D$ is a bounded domain in $\mathbb{R}^2 = \{(x^1, x^2)\}$ of class $C^{2k}$. We give sufficient conditions for $u$ to have the $k^{\text{th}}$ order continuous derivatives with respect to $(x^1, x^2)$ in $\bar{D}$, for integers $k \geq 2$. The equation is supplemented with $C^{2k}$ boundary data and we assume that $f \in C^{2(k-1)}$. We also prove that our conditions are sharp by given examples in the border cases, which are almost identical to an example suggested by H. Weinberger.