Partial Differential Equations,
An Introduction to Theory and Applications
by
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Corrections to Text

page 27, problem 3: This problem is too hard (but can be done with maple or mathematica). Calculate \( u_2(x) \) only.

page 41: problem 7 should be the initial value problem posed on the plane \((x, y) \in \mathbb{R}^2\).

A better version of the problem is:
7b. Use the method of characteristics to solve the initial value problem for \( u = u(x, y, t) \) on the domain \(-\infty < x, y < \infty\), small \( t > 0 \):

\[
\begin{align*}
    u_t + y u_x + uu_y &= 0, \\
    u(x, y, 0) &= x + y.
\end{align*}
\]

Show that the solution has a singularity as \( t \to t^* \) for some \( t^* > 0 \), and find the value of \( t^* \).

Problem 10 should refer to a different example - example 5, chapter 2.

page 55, near top: \((x-t)\) should read \(x-ct\). In the formula for \( u(x,t) \), the lower limit of the integral should read \(ct-x\).

page 62, problem 7: the formula for \( u \) should have an additional term:

\[
\begin{align*}
    u(x, t) &= -\int_{0}^{t-x} h(y) \, dy + \frac{1}{2} \left( \phi(x + t) + \phi(t - x) \right) + \frac{1}{2} \int_{t-x}^{x+t} \psi(s) \, ds + \int_{0}^{t-x} \psi(s) \, ds.
\end{align*}
\]

page 79, problem 2: Include “in \( \mathbb{R}^n \)”

page 117, problem 7.5: a ‘+’ should be ‘=’. Prove

\[
(f * g)' = f' * g = f * g'.
\]

page 118, problem 6(b): There should be a \( \pi \) in the argument of \( \sin \): \( \sin \pi(x-n) \).

page 137, Example 1. Integral of \( \eta(x) \) should be over \( x \in \mathbb{R}^n \).

page 138: Delete sentence after Lemma 9.1.

page 147: Third line of text should read: “We now investigate the contributions from \( \partial B(x, \epsilon) \) as \( \epsilon \to 0 \).”

page 150, problem 1(c) should read: “Write the solution \( u(x) \) satisfying \( u(0) = 0 \) in the form”

page 150, problem 9: Hint should be \( u = v/r \).

page 173, problem 3: Missing minus sign on \( u'' \). \( Lu(x) = -u'' + c(x)u \)

page 219: line 5 from bottom: \( w \) should be \( \psi \).

page 243: problem 5: Define \( g(r) = rf(r) \). Then properties in parts (a), (b) can be stated cleanly in terms of derivatives of \( g \). In particular, genuine nonlinearity depends on \( g''(r) \neq 0 \) rather than the condition \( f''(r) > 0 \) stated in the text.