Assignment-11

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment.

1) Let $u$ be a solution of $u_{t} - u_{xx} = 0$, $(x, t) \in \mathbb{R} \times (0, \infty)$ with the boundary conditions $u(x, 0) = \begin{cases} 0, & -\infty < x < -1 \\ x + 1, & -1 \leq x \leq 0 \\ 1, & 0 < x \leq 1 \\ 0, & 1 < x < \infty \end{cases}$ and Then

$$u(x, 0) = \begin{cases} 0, & -\infty < x < -1 \\ 1, & -1 \leq x \leq 1 \\ 0, & 1 < x < \infty \end{cases}$$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$u(1, \frac{1}{2}) = \frac{1}{2}$.
$u$ is smooth in a neighbourhood of $(1, \frac{1}{2})$.
$u$ is never smooth.

2) Let $u$ be a solution of $u_{t} - 9u_{xx} = e^{u} - e^{-u}$, $(x, t) \in \mathbb{R} \times (0, \infty)$ with the boundary conditions $u(x, 0) = x$, $x \in \mathbb{R}$; $u(0, 0) = \sin x$, $x \in \mathbb{R}$. Then

No, the answer is incorrect.
Score: 0
Accepted Answers:
$u(x, t) = x + \frac{1}{2} \sin x \sin 3t - \frac{3}{2} \sinh x + \frac{1}{2} \sinh x \cosh 3t$

3) Let $u$ be a solution of $u_{tt} - u_{xxx} = 0$, $(x, t) \in \mathbb{R} \times (0, \infty)$ with the boundary conditions $u(x, 0) = 0$, $u_{x}(x, 0) = \sin x$, $x \in \mathbb{R}$. Then

No, the answer is incorrect.
Score: 0
Accepted Answers:
$u(x, t) = x + \frac{1}{2} \sin x \sin 3t - \frac{3}{2} \sinh x + \frac{1}{2} \sinh x \cosh 3t$

4) The problem $u_{tt} - \Delta u = F(x, t)$, $(x, t) \in \mathbb{R} \times (0, \infty)$ with the boundary conditions $u(x, 0) = g(x)$, $u_{x}(x, 0) = h(x)$, $x \in \mathbb{R}$ admits almost one solution.

No, the answer is incorrect.
Score: 0
Accepted Answers:
$u(x, t) = u(0, t) = \frac{1}{2} [\sin(x - t) - \sin(x + t)] + \sin t$

If $f$, $g$, $F(\cdot, t)$ are even functions, $u(\cdot, t)$ is also even.
If $u(\cdot, t)$ is odd function, $f$, $g$, $F(\cdot, t)$ are even.
If $f$, $g$, $F(\cdot, t)$ are periodic of period $L$, $u(\cdot, t)$ is also periodic of period $L$. 