Assignment-08

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1) Let $u$ solve the equation $u_t = u_{xx}; u(0, t) = 0 = u(t, 0), u_x(0, 0) = \frac{1}{2}\sin x - \frac{1}{3}\sin 3x$. Then
   - $u$ attains its maxima at exactly one point.
   - $u$ attains its minima at exactly one point.
   - There does not exist any maxima of $u$.
   - $\text{SMP}$ does not hold for $u$.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - $\text{SMP}$ does not hold for $u$.

2) Let $f, g$ be continuous and consider $u_t - \Delta u = f, u|_{\partial \Omega} = g$ on $\Gamma_T$.
   - If $\Omega$ is bounded, then there is a unique solution.
   - If $\Omega = \mathbb{R}^n$, then there is a unique solution.
   - If $\Omega$ is any open set, then there is a unique solution.
   - Never admits a unique solution.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - $\text{If } \Omega \text{ is bounded, then there is a unique solution.}$

3) Let $\Omega$ be bounded and open and $w$ solve $w_t - \Delta w = 0$ in $\Omega_T = \Omega \times (0, T)$; $w = 0$ on $\Gamma_T$. Define $E(t) = \int_{\Omega} w^2(x, t)dx$. Then
   - $E$ exists but it is not continuous.
   - $E(t) \leq 0$
   - $E(t) \leq 0$ does not exist.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - $\text{If } \Omega \text{ is bounded, then there is a unique solution.}$

4) Let $\Omega$ be bounded and open and $u$ solve $u_t - \Delta u = 0$ in $\Omega_T = \Omega \times (0, T)$; $u = 0$ on $\Gamma_T$. Define $u(x, t) = w(x, t) = \frac{e^{-\frac{x^2}{4(T-t)}}}{(2\pi T-t)^{n/2}}$.
   - $\Omega \subset \mathbb{R}^n \times (0, T)$.
   - $\Omega = \mathbb{R}^n \times (0, T)$.
   - $\Omega \approx \mathbb{R}^n \times (0, T)$.
   - None of the above.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - $\text{If } \Omega \text{ is bounded, then there is a unique solution.}$

5) Consider the problem $u_t - \Delta u = 0$ in $\mathbb{R}^n \times (0, T)$; $u = 0$ on $\mathbb{R}^n \times (0)$. Then
   - There are at least two solutions.
   - Each nontrivial solution grows very rapidly as $|x| \to \infty$.
   - $u = 0$ is the only solution.
   - None of the above.
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - $\text{There are at least two solutions.}$
   - Each nontrivial solution grows very rapidly as $|x| \to \infty$. 
   

Due on 2021-03-17, 23:59 IST IST.