Math 241 Homework#4

Heat equation

Read *A*pplied PDE by Haberman (5th edition) Chapter 2.5.

1. *A*pplied PDE by Haberman, chapter 2.5, exercise 2.5.1 (a),(c).

2. *A*pplied PDE by Haberman, chapter 2.5, exercise 2.5.2 (b), (c).

3. *A*pplied PDE by Haberman, chapter 2.5, exercise 2.5.3 .

4. *A*pplied PDE by Haberman, chapter 2.5, exercise 2.5.5 (a),(d).

5. Let D be a bounded region in $\mathbb{R}^2$ and $u(x, y)$ is a solution to Laplace equation on D. Prove that

$$\int_{\partial D} \frac{\partial u}{\partial n} = 0.$$

   Explain this result using physics.

   (Hint: use integration by parts

$$\int_{\Omega} f \Delta g = \int_{\partial \Omega} f \frac{\partial g}{\partial n} - \int_{\Omega} \langle \nabla f, \nabla g \rangle$$

   with suitable choices of f and g.)