Homework 5–21-124, Calculus II for Biologists and Chemists

Name: _____

Section: _____

Instructions: Complete the following problems, clearly labeling the problems. Staple this sheet, with your name and section filled in, to the top of your work. Failure to attach this sheet will result in a one point deduction in the grade. The assignment will be graded out of twenty points.

DUE: Friday, February 26, 2016

Book Problems

- Section 9.4: 4, 22, 30, 36, 42

- Section 10.1: 2, 4, 12, 18

- Section 10.2: 10, 14, 18, 24

- Section 10.3: 2, 6, 12, 18, 20, 26, 34, 44, 46, 50

Other Problems

Just as we have differential equations (some of which we have looked at in class), there are equations involving unknown functions and their partial derivatives, called *partial differential equations*. In order to be a solution of a partial differential equation, a function and its derivatives must satisfy the given equation.

1. Verify that for any constant k, $u(x,t) = \sin(kx)\sin(kt)$ satisfies $\partial_{tt}u = \partial_{xx}u$.

2. Let
$$u(x_1, \ldots, x_n) = e^{a_1 x_1 + \ldots + a_n x_n}.$$

If $\sum_{i=1}^{n} a_i^2 = 1$, show that u satisfies

$$\sum_{i=1}^{n} \frac{\partial^2 u}{\partial x_i} = u.$$