Math 366, Winter '03
Homework 4

From Rudin. pp 239-241: 15, 21b, 23

Profs Personal Problems:

1. Consider the mapping $f : \mathbf{R}^4 \to \mathbf{R}^2$ given by

$$f(x, y, z, w) = (x^2 - y + z, y^2 - x + w).$$

Note that $f(1, 1, 0, 0) = (0, 0)$.

- Show that the equation(s) $f(x, y, z, w) = (0, 0)$ can be solved locally near $(1, 1, 0, 0)$ for x and y in terms of z and w.
- Use linear approximation of f to find a good approximation (x_1, y_1) of a point (x, y) such that $f(x, y, .1, -.2) = (0, 0)$.
- Use linear approximation of f about your new point to further improve your first approximation.

2. Given that the implicit function g (from the implicit function theorem) exists and is C^1, prove that the formula for the linear approximation for g at (a, b) is as adverstised.