From Rudin. pp 239-241: 15, 19, 21, 23

Profs Personal Problems:

1. Consider the mapping $f :^4 \to ^2$ 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 a slightly different point) to further improve your first approximation.