Lesson 20. Optimization with Equality Constraints, cont.

Example 1. Suppose that you are interested in dividing your savings between three mutual funds with expected returns of 10%, 10% and 15%, respectively. You want to minimize risk while achieving an expected return of 12%. To measure risk, use the *variance* of the return on investment: when a fraction x of your savings is invested in Fund 1, y in Fund 2, and z in Fund 3, the variance of the return is

$$v(x, y, z) = 400x^2 + 800y^2 + 200xy + 1600z^2 + 400yz$$

a. Consider the equality constraints below. Why do these constraints make sense for this problem?

$$1.10x + 1.10y + 1.15z = 1.12$$
$$x + y + z = 1$$

b. Find the local optima of the variance of the return v, subject to the equality constraints given in part a.

c. How much should you invest in the three mutual funds?