Assignment 8

Consider a two objective optimization problem

$$\max_{x \in S} f(x) = [f_1(x), f_2(x)]^T = [x_1, x_2]^T$$
$$S = \{x = (x_1, x_2) \mid x_2 - 0.5x_1^2 \geq 0,\ x_2 + 0.5x_1^2 - 4 \leq 0,\ x_1 \geq 0\}.$$

Use the GDF algorithm with three iterations and starting point $x = (0.60, 0.25)$ to solve the problem. In step (4) of the algorithm (Miettinen p. 143), the decision maker selects the more preferred of two objective vectors z^1 and z^2 ($z^j = f(x^h + t_j^h d^h)$), which are computed with step lengths $t_1 = 0.5$ and $t_2 = 1$ (Miettinen, p. 145).

The decision maker's preferences are consistent with the utility function $U(f) = f_1^{1/5} + f_2^{1/5}$.

Notice that f is maximized here, but minimized in Miettinen's formulation

Notice also that it is assumed that the DM is able to evaluate $\nabla U(f)$ precisely at any (f_1, f_2).