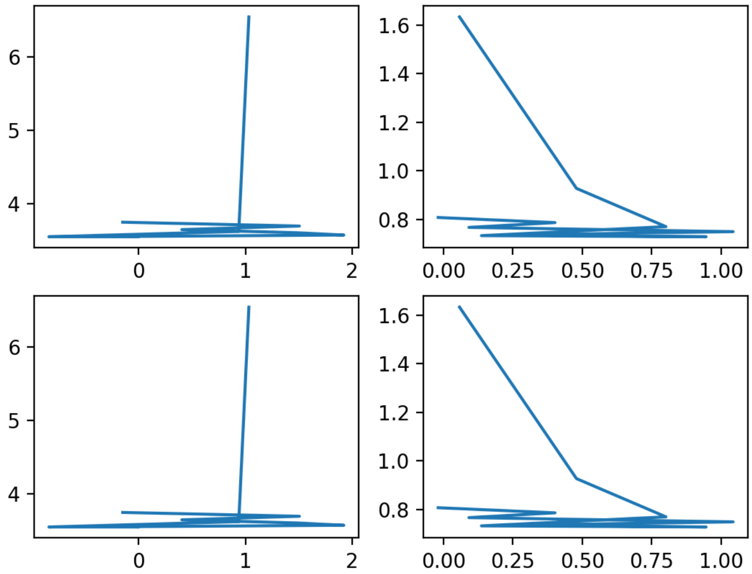
1 Result of task $1/2/3$

1.1 Implementation Task 1

The plot of histories of objective functions and given random y_i is the following



Question 1.1 IGD_wo_task1 must converge to the true solution (mean value of y)

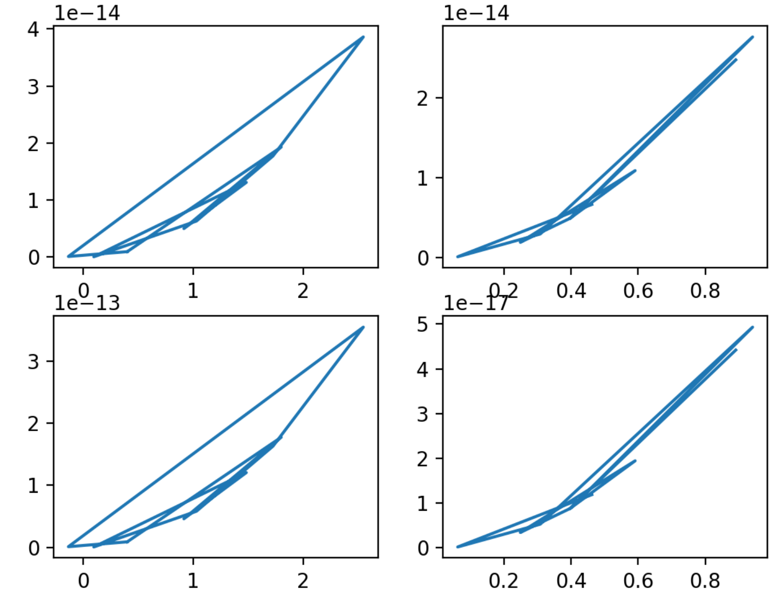
Proof. When y is of normal distribution $\mathcal{N}(0.5, 1)$ and y is of uniform distribution in $(0.5 - \frac{1}{\sqrt{3}}, 0.5 + \frac{1}{\sqrt{3}})$, the mean value is $\bar{y} = 0.5$, as

$$x_n = \frac{1}{n}\sum_{j=1}^{n} y_{i_j}$$

, by iteration, $x_n = \bar{y}$. $\square$

1.2 Implementation Task 2

The plot of histories of objective functions and given random β_i is the following



1.3 Implementation Task 3

The plot of histories of objective functions and the norm $\|x_k - x^*\|$ is the following