Assignment 3

Peter Lorenz

Infimal Convolution: Several lambdas={0.1, 0, 10} are used to show the infimal convolutions.
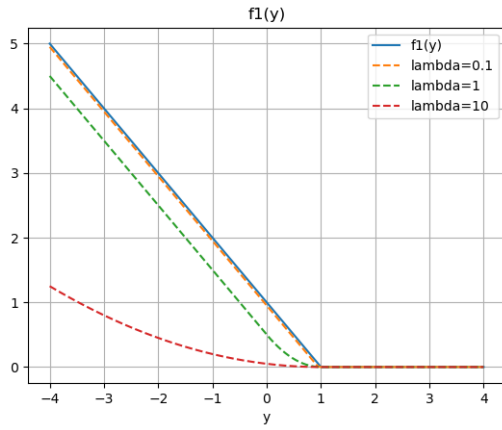

Figure 1: $f(y) = max(0, 1 - y)$
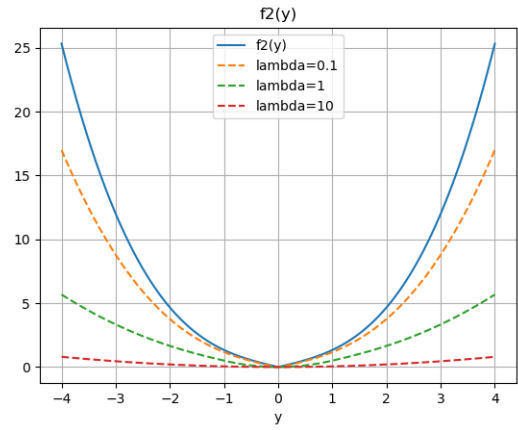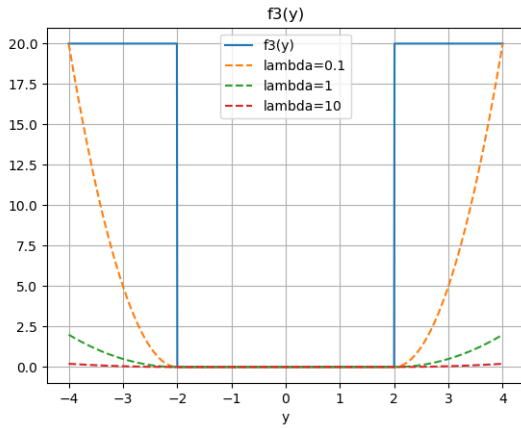

Figure 2: $f(y) = |y| + \frac{1}{3}|y|^3$

Figure 3: $f(y) = \begin{cases} 0 & if \ y \in [a, b] \\ +\infty & else \end{cases}$
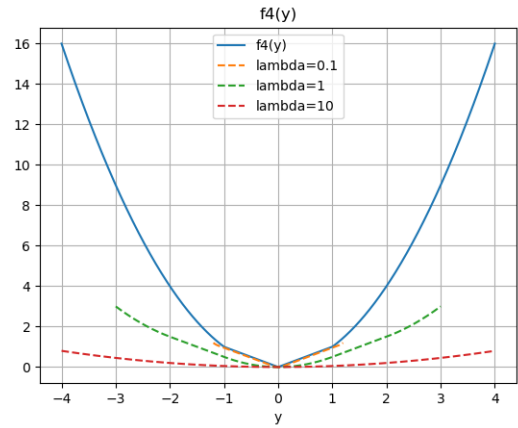

Figure 4: $f(y) = max(|y|, y^2)$

Proximal Operators: Beside the original function (blue), we plotted the proximal of the function (orange).
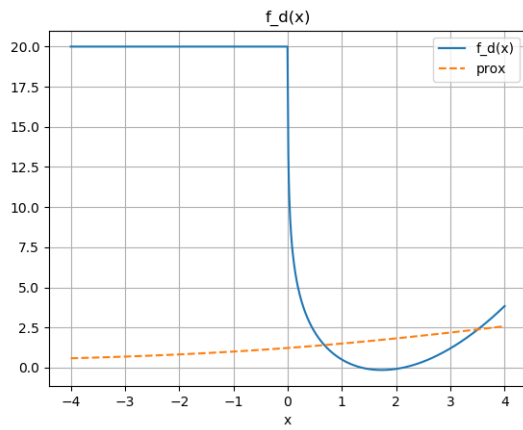

f_d(x)

f_e(x)

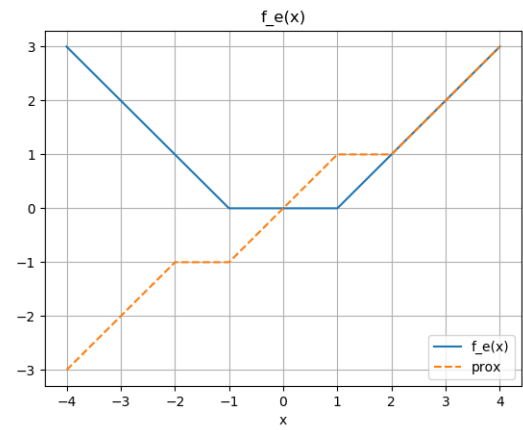Figure 5: $f(x) = \begin{cases} -aln(x) + \frac{x^2}{2} & x > 0 \\ +\infty & x \leq 0 \end{cases}$
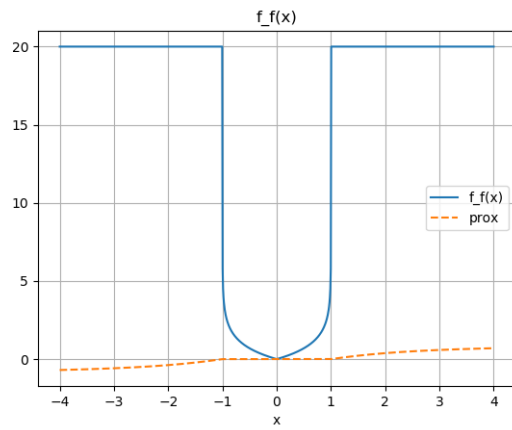
Figure 6: $f(x) = max(|x| - a, 0)$

f_f(x)

Figure 7: $f(x) = \begin{cases} ln(a) - ln(a - |x|) & for\ |x| < a \\ +\infty & otherwise \end{cases}$

(F)ISTA: The followig plots show the comparison of the ISTA and to the fast one FISTA. In the end, the Energey of ISTA and FISTA will be equal.
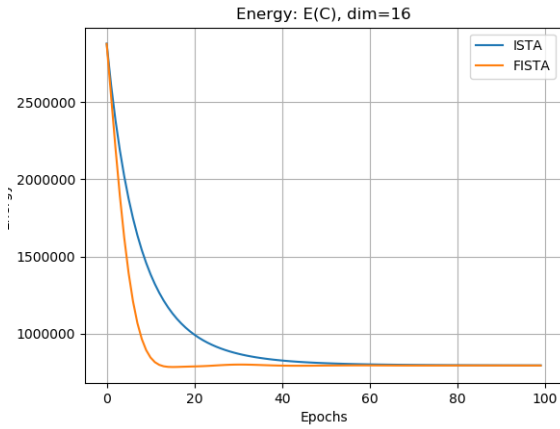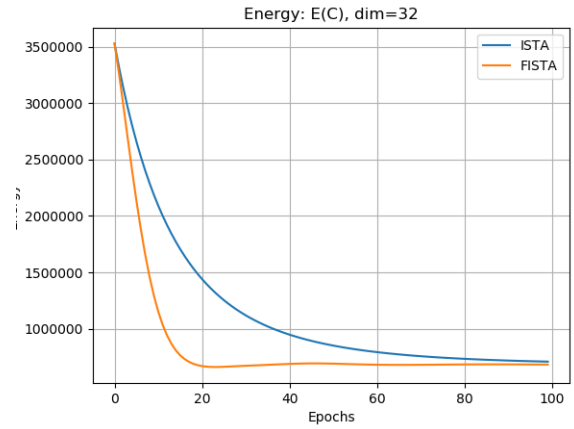

Figure 8: Energy Plot. 16 Dim
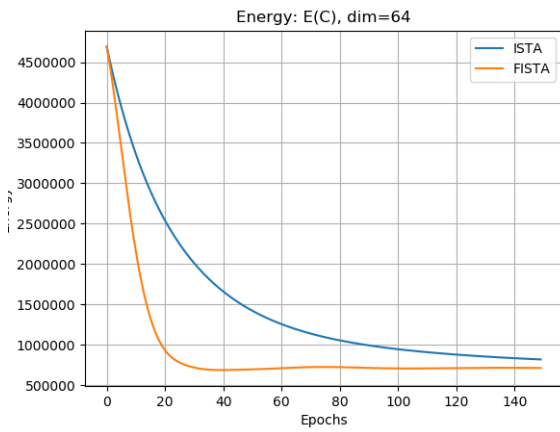

Figure 9: Energy Plot. 32 Dim
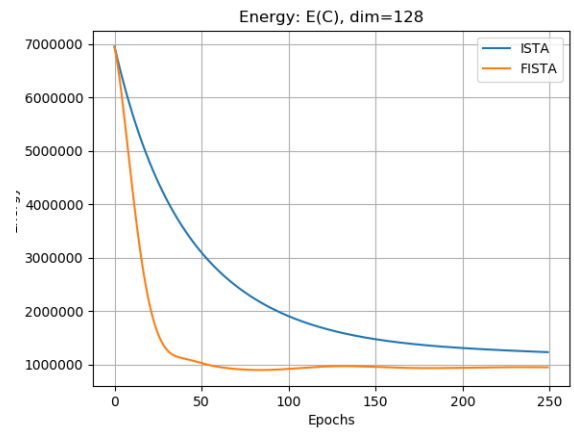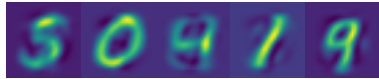

Figure 10: Energy Plot. 64 Dim
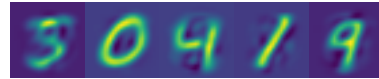

Figure 11: Energy Plot. 128 Dim

Reconstructed Images: We want to reconstruct images where have the an original data base and a D with parts of B and C that we want to find. D multiplicated with C gives us the reconstructed image of matrix B. The higher the dimension={16,32,64,128} of D the better the reconstruction.
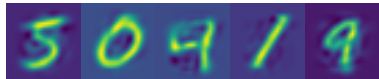
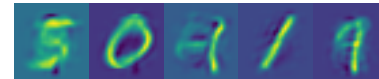

Figure 12: Original Data Base B

(a) Reconstructed DC 16
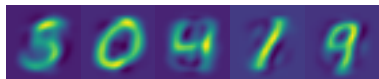

(b) Reconstructed DC 32

(c) Reconstructed DC 64

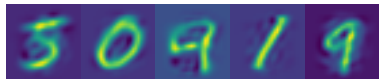(d) Reconstructed DC 128

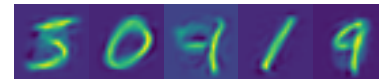Figure 13: ISTA reconstructed

(a) Reconstructed DC 16

(b) Reconstructed DC 32

(c) Reconstructed DC 64

(d) Reconstructed DC 128

Figure 14: FISTA reconstructed