HW2(a)-1:

The Gradient formulation of f(w) is calculated wrongly. The term “exp{-y w x}” is missing in the nominator. Therefore, the value found for B is wrong. The right value for B is as follow:

$$\frac{1}{N} \sum |y_i| \|x_i\|_2 + 2\lambda D$$

HW2(a)-2:

To prove the smoothness of the functions, the mathematical proof is required and plotting an estimation of the function (without using any tool like MatLab) is not a valid proof. In addition, the value found for L is not correct. As a matter of fact, just the inequality definition for smoothness is written in the solution.

The correct value of L for f_i is:

$$\underbrace{\tfrac{1}{4} |y_i|^2 x_i x_i^T}_{L \text{ for } f_i(w)}$$

The correct value of L for f is:

$$\underbrace{\frac{1}{4N} \sum_i |y_i|^2 x_i x_i^T + 2\lambda I}_{L \text{ for } f(w)}$$

HW2(a)-3:

For this section, the figure of Hessian of f is drawn and there is shown that it is always positive, so it is convex.

However, to prove the strong convexity just the definition of strong convexity is written for f(x). In other words, it is not shown whether the inequality definition holds or not! You should verify that this inequality holds for the f(x). Accordingly, the value of μ is not found. The value of μ is as follow:

$$\nabla^2 f(w) = \frac{1}{N} \sum \nabla^2 f_i(w) + 2\lambda I \xrightarrow[\text{\& in } \infty \text{ we have}]{\text{again with the same reasoning,}} \nabla^2 f(w) \geq 2\lambda I$$

$$\Rightarrow f(w) \text{ is strongly convex with } \mu = 2\lambda$$

HW2(b):

It is correct.

HW2(c):

The proof is correct