Coursework 1 General Feedback:

The overall level of the coursework was very good, many attempts of outstanding quality.

Feedback by question:

- Q1. Most of the students was able to correctly state the optimality condition, find stationary points, and classify 4 points as saddle points by looking at the determinant of the Hessian. Regarding (0,0), some mixed answers: many students claimed it was a local min. solely based on the Hessian positive semi-definite, but this could also be a saddle point. A fair number of students observed that the objective was non-coercive, or that the function reaches smaller values than f(0,0), thus discarding a global min. Few students went all the way to use the local min definition to show that there exists a ball around the origin where f(0,0) is smaller than any other point in the ball.

- Q2.1. Most of the students stated the right matrices (some students added some rows full of 0's which is unnecessary but ok) and the optimality condition. Regarding existence and uniqueness there were mixed answers: a fair number of students correctly identified this has to do with the invertibility of the matrix formed by the LLS cost and regularizers, but some stated a condition on the kernel of the matrices without making any further observation, such as the cases when delta>0, or the case w1 different from 0, which both guarantee existence and uniqueness of solution.

- Q2.2.1 Most of the students obtained the right plot and determined convergence of J to 100. Not so many students identified this as the behaviour when u goes to 0 and that 100 is actually the norm of the zbar signal. Some students who did not proceed as indicated concluded that J diverges, which is not correct.
- Q2.2.2 Most of the students obtained the right plots and identified the smoothing effect of the regularizer and that the specific case delta=eta=0 leads to a LLS problem where the matrix T is invertible, and the signal is recovered exactly.
- Q2.2.3 Most of the students operated correctly with the denoising framework, obtaining the right plots. In the line search part, there were some mixed answers: some students applied directly a related result from the live session to the specific setting, which is correct, but some others started from scratch, with quite lengthy answers, most of the were ok.