Exercise 1 (SVR):

A) These points have been fit by ε-SVR with two different costs C. Can you tell which fit uses a higher cost C?

B) Sketch the regression line and ε-tube obtained using ε-SVR on the points below. Also sketch the regression line and ellipses obtained using GMR. What are the differences? Which method would you use if you needed to know the certainty of your estimates?

Exercise 2 (GMR):

A) For each of these 2D distributions fitted with Gaussian Mixture Models (GMM), draw approximately the expected result of Gaussian Mixture Regression (i.e. the regressive signal given by GMR) on top of the datapoints. Consider that, as we did in class, we compute $E\{p(y|x)\}$ where $x$ is the “abscisse” and $y$ is the “ordinate” axes (in French). Assume an equal prior for each of the Gaussians:
B) Similarly as in the previous question, draw approximately the expected result of GMR. However, take this time into account the priors of each Gaussian (these are the $\alpha$ values below). Note that these priors are arbitrary and may not correspond to the real prior found by GMM on this dataset:

C) What shape of regression function can you achieve with only one Gaussian in GMR? Does it depend on the covariance matrix of the Gaussian? (Supplementary question: prove the previous answer by computing the output of a GMR with a diagonal Gaussian).

D) Draw a 2D example where two different GMMs give the same GMR output (only draw the Gaussians, you do not have to draw a dataset). Assume equal priors.