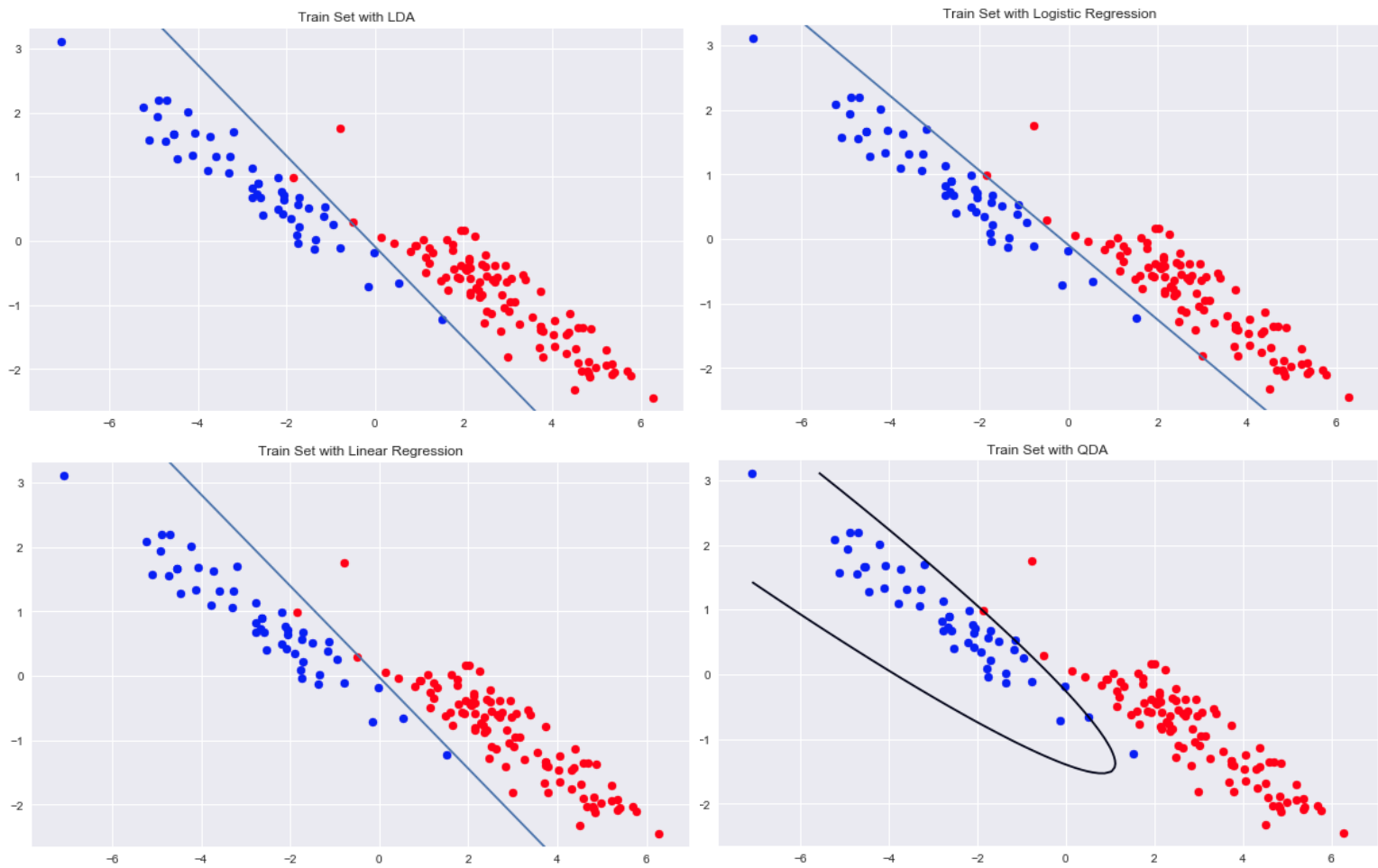


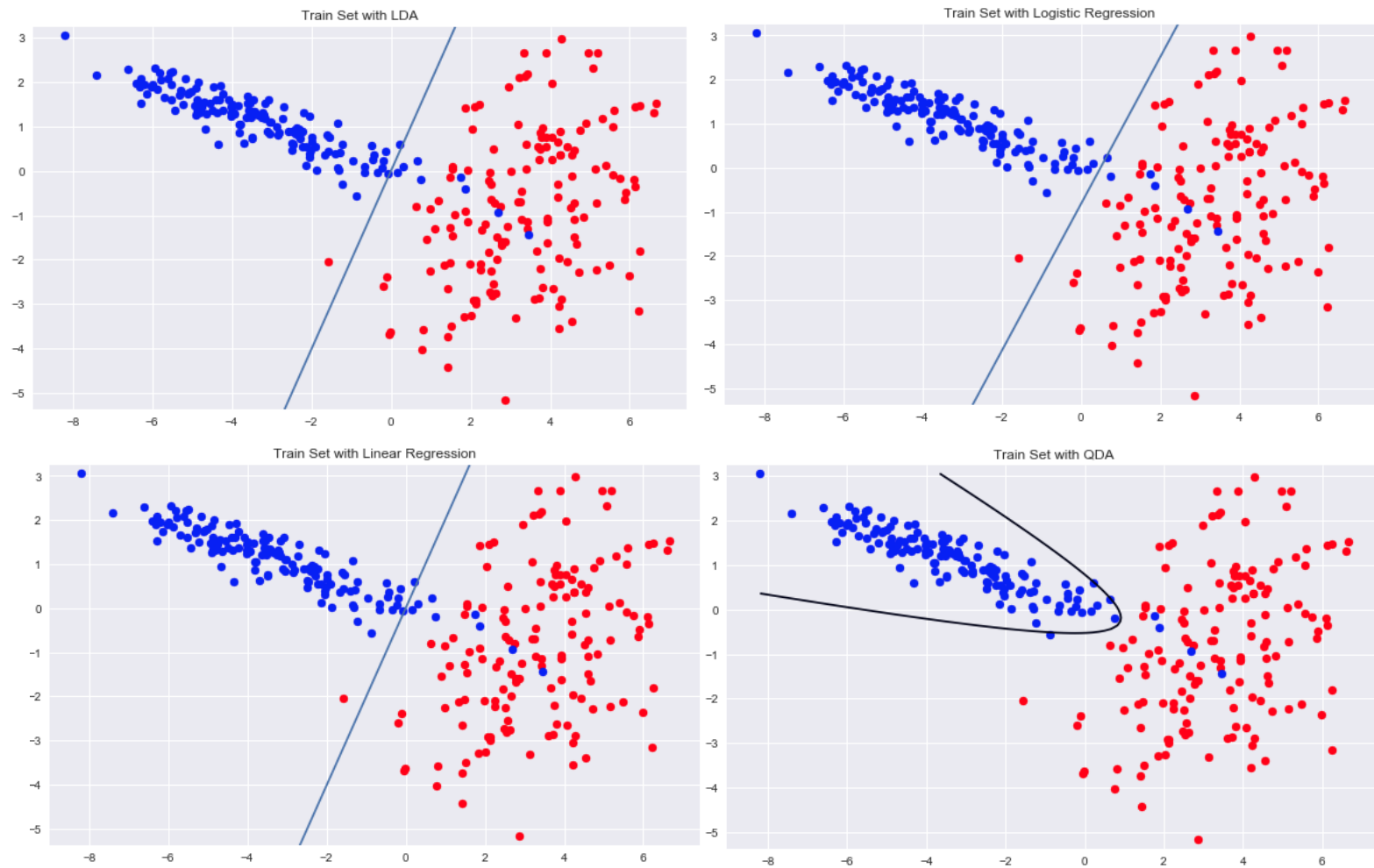
## Dataset A :



		Train errors	Test errors
Classifier			
	LDA	0.013333	0.020000
	Logistic_Regression	0.000000	0.034667
	Linear_regression	0.013333	0.020667
	QDA	0.020000	0.030667

With this dataset, the logistic regression has perfectly separated the training data but its prediction score on the test set is the lowest. This is because the logistic regression model aims to separate the data with a hyperplane but does not consider the noise of data, hence, it is overfitting it. The assumption that the classes have similar covariance matrix seems correct since the LDA model has approximately the same error in the training set and the test set. Plus, the model has the best prediction score. As both classes have the same distribution and are well separated, the linear regression is a good solution and does almost as well as LDA. The QDA classifier has the worst training error and is just a bit better than Logistic Regression on the test set. Indeed, the data seems to be separable by a hyperplane, so doing it with a quadratic form is not appropriate. There is almost no difference between linear regression and LDA, if we look at the separating hyperplanes they also look the same.

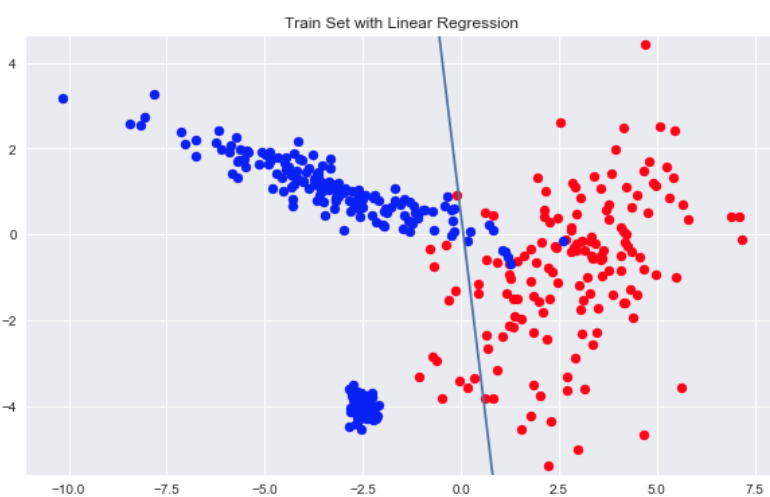
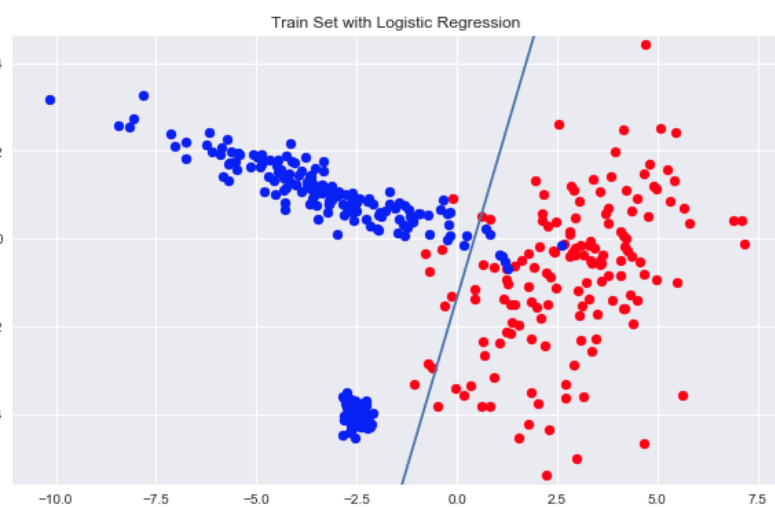
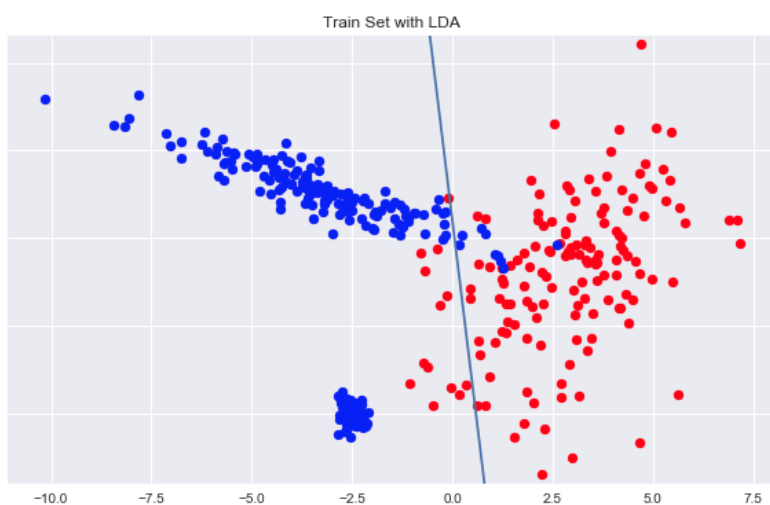
## Dataset B :



Classifier	Train errors		Test errors	
LDA	0.030000	0.0415		
Logistic_Regression	0.020000	0.0430		
Linear_regression	0.030000	0.0415		
QDA	0.016667	0.0215		

With the dataset B, logistic regression is still doing the best training score and the worst testing score. LDA, logistic regression and linear regression have about the same testing score. This is because the classes are not separable by a hyperplane. Some points of the blue class are mixed with the red class and it does not look like noise. For the LDA model, the assumption that classes have the same covariance matrix is clearly false, the red class is more spread than the blue one. As the covariance matrix are different and that it has a quadratic form, the QDA model is better than the others. The model can correctly wrap data. Again, linear regression and LDA give the same results, here the hyperplanes exactly look the same.

## Dataset C :



	Train errors	Test errors
<b>Classifier</b>		
<b>LDA</b>	0.055	0.042333
<b>Logistic_Regression</b>	0.040	0.022667
<b>Linear_regression</b>	0.055	0.042333
<b>QDA</b>	0.050	0.041000

In this case, logistic regression beats all the other classifier in both the training set and the test set. Though the dataset look like dataset B, the fact that the blue class is separated in two groups makes it difficult for QDA to fit the data as in B. Hence, the conic wraps the red dataset but the result is not as good as in B and, here, the logistic regression does better. LDA and Linear regression have the same errors in both datasets and have the same separating lines.