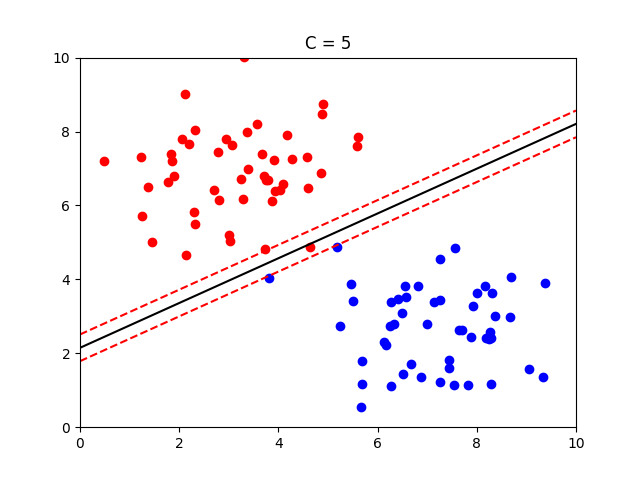
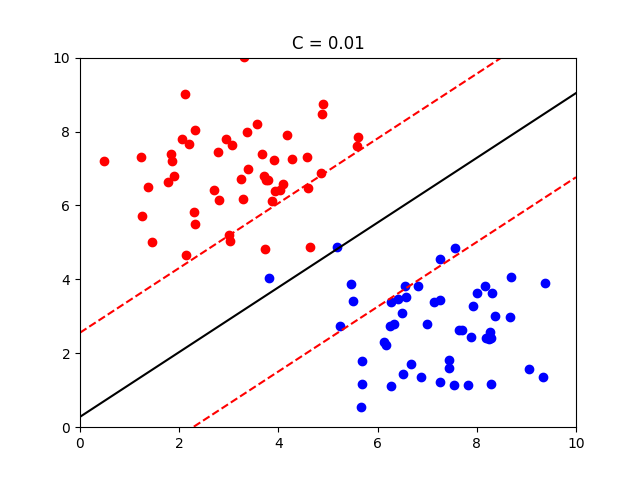
**Week 11 Worksheet: Support Vector Machines**

In these questions, you will be presented with data which we are trying to analyse and separate into red and blue, and in doing so creating a model which will allow the reliable classification of unseen data.

**Part A – Hardness/softness of margins**

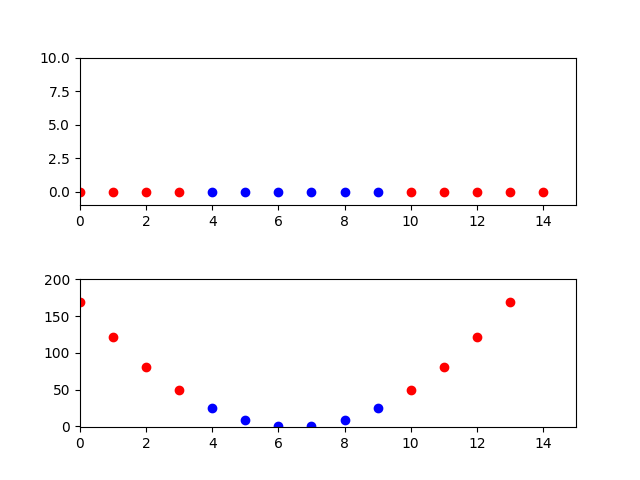
These two graphs show the same set of data which has been fit with a linear kernel SVM, using different parameters to change the hardness of the margin.

Model A Model B



Explain the advantages of using Model B, with reference to:

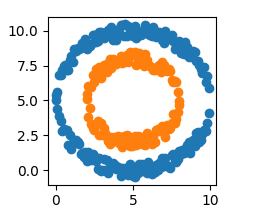
* hard and soft margins
* how well the model will respond to new data
* overfitting/underfitting

**Part B – Transforming Data**

The data in the first figure on the right has been gathered based on one property and its corresponding classification, e.g. the data point where x = 3 is classified as red, and the data point where x = 8 is classified as blue.

Explain briefly how the data has been transformed to produce the figure below it, and why this is useful.

**Part C – Beyond 3 Dimensions**



Explain briefly how a SVM separates these data, comparing the technique to the examples above.