

# Homework 7

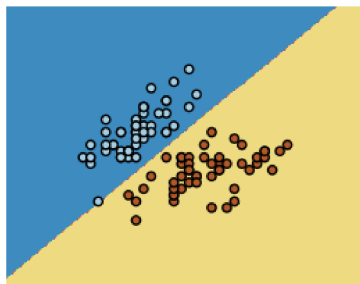
Jacob Sachs

5 June 2013

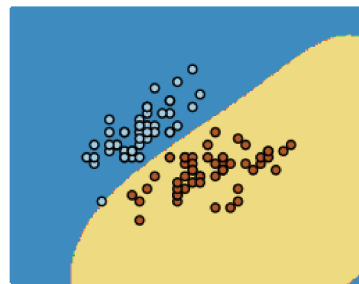
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## Question 1

SVC with linear kernel

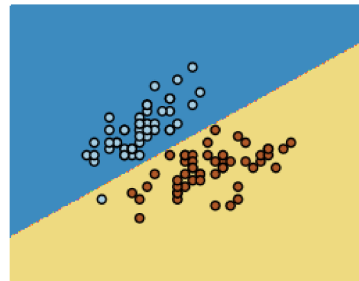
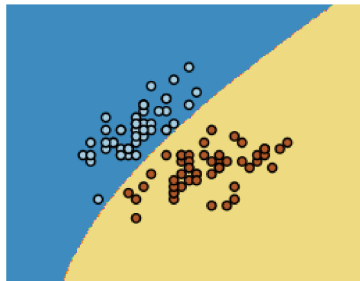


SVC with RBF kernel



Out[1]=

SVC with polynomial (degree 3) kernel    LinearSVC (linear kernel)



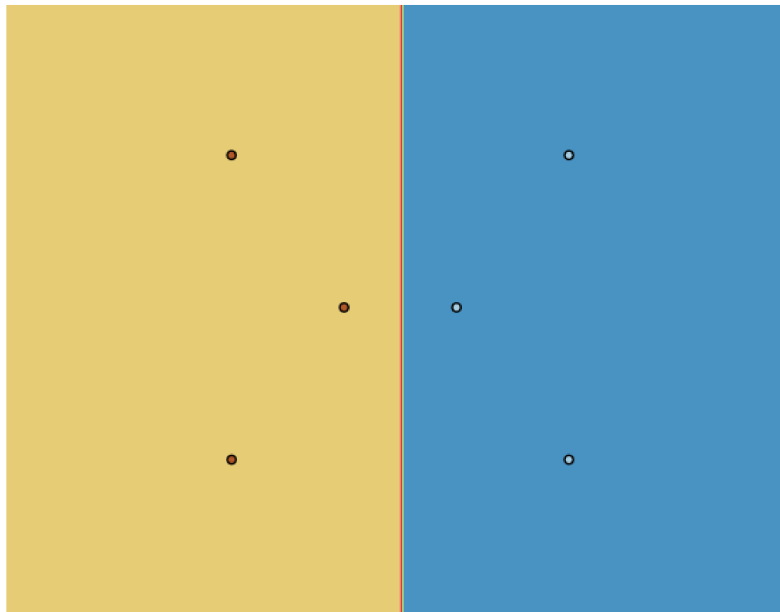
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## Question 2

### ■ Two Support Vectors

```
In[2]:= Import["/Users/Jacob/jsachs13-cs25010-spr-13/hw7/2supportvec.png"]
```

SVC with linear kernel

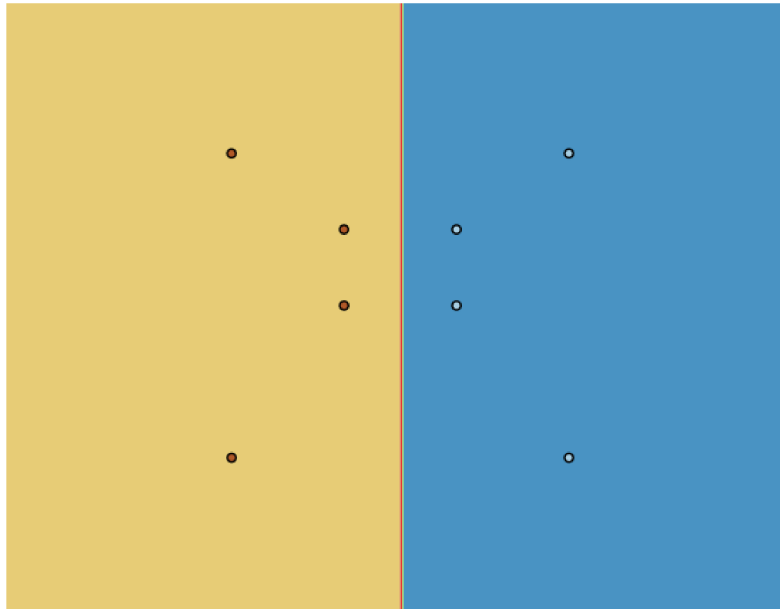


There are clearly two datapoints defining the margin; these are the two support vectors.

### ■ Four Support Vectors

SVC with linear kernel

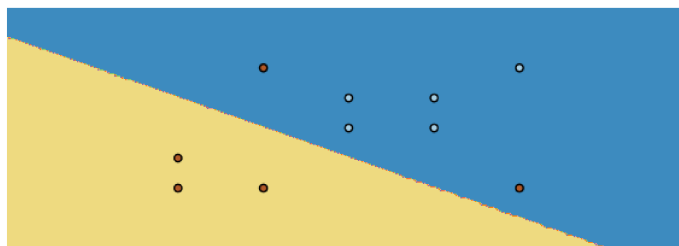
Out[5]=



There are clearly four datapoints defining the margin. These are the support vectors.

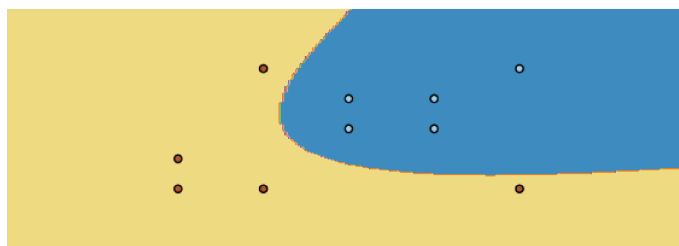
### ■ Polynomial, not Linear

SVC with linear kernel



Out[7]=

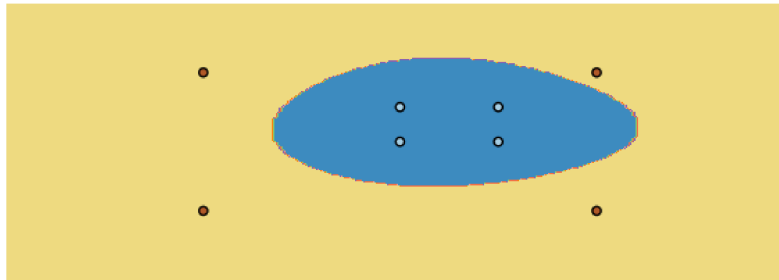
SVC with polynomial (degree 3) kernel



The linear kernel does not work, while the polynomial kernel perfectly separates the classes by curving around the data in the upper right.

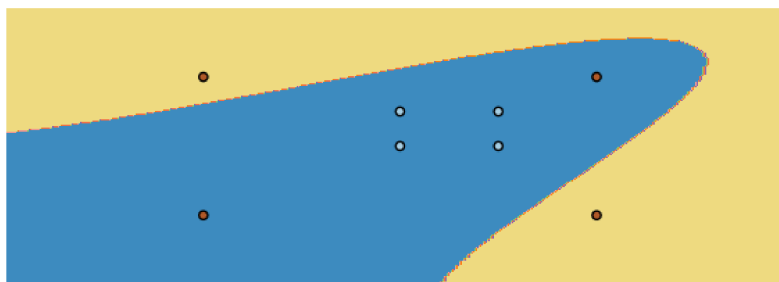
■ **Gaussian, not Polynomial**

SVC with RBF kernel



Out[8]=

SVC with polynomial (degree 3) kernel



The polynomial kernel does not work, while the gaussian kernel can separate the classes by surrounding the data in the center.

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### Question 3

- **Zeros v. Ones**
- **Linear**
- **Polynomial**
- **Gaussian**
- **Ones v. Sevens**
- **Linear**
- **Polynomial**
- **Gaussian**
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