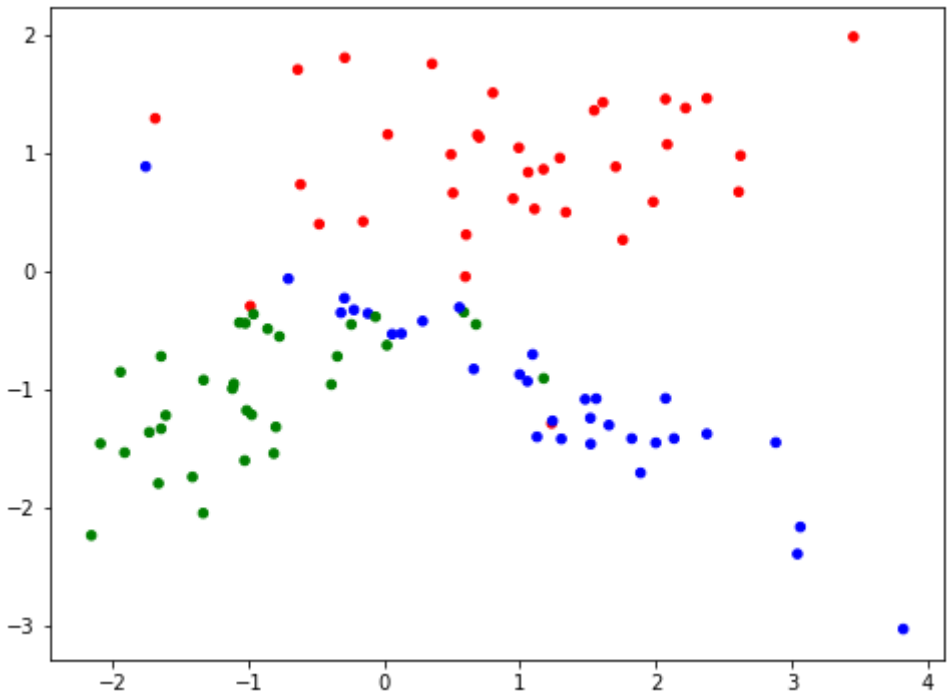
In [2]:

```
#Генерация и визуализация данных
#Часть кода взята с семинаров
from matplotlib.colors import ListedColormap
from sklearn import cross_validation, datasets, metrics, neighbors
from sklearn.model_selection import KFold
import numpy as np
%pylab inline
%matplotlib inline
classification_problem = datasets.make_classification(n_samples=100, n_features =2, n_infor
                                    n_clusters_per_class=1, random_state=3)

colors = ListedColormap(['red', 'blue', 'green'])
light_colors = ListedColormap(['lightcoral', 'lightblue', 'lightgreen'])
pylab.figure(figsize=(8,6))
pylab.scatter(map(lambda x: x[0], classification_problem[0]), map(lambda x: x[1], classific
              c = classification_problem[1], cmap = colors, s = 20)
```

```
C:\Users\Alexander\Anaconda2\lib\site-packages\sklearn\cross_validation.py:4
4: DeprecationWarning: This module was deprecated in version 0.18 in favor o
f the model_selection module into which all the refactored classes and funct
ions are moved. Also note that the interface of the new CV iterators are dif
ferent from that of this module. This module will be removed in 0.20.
  "This module will be removed in 0.20.", DeprecationWarning)

Populating the interactive namespace from numpy and matplotlib
```

Out[2]:

```
<matplotlib.collections.PathCollection at 0x9d6cda0>
```

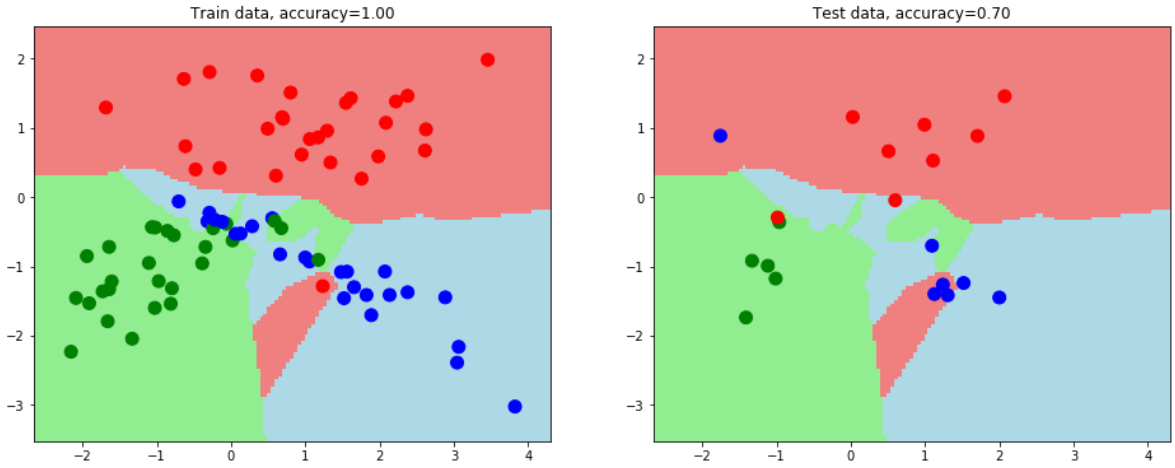


In [3]:

```
train_data, test_data, train_labels, test_labels = cross_validation.train_test_split(classi
                                                   classification_problem[1], test_size = 0.2,

def get_meshgrid(data, step=.05, border=.5,):
    x_min, x_max = data[:, 0].min() - border, data[:, 0].max() + border
    y_min, y_max = data[:, 1].min() - border, data[:, 1].max() + border
    return np.meshgrid(np.arange(x_min, x_max, step), np.arange(y_min, y_max, step))

def plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels,
                          colors = colors, light_colors = light_colors):
    estimator.fit(train_data, train_labels)
    pyplot.figure(figsize = (16, 6))
    pyplot.subplot(1,2,1)
    xx, yy = get_meshgrid(train_data)
    mesh_predictions = np.array(estimator.predict(np.c_[xx.ravel(), yy.ravel()])).reshape(x
    pyplot.pcolormesh(xx, yy, mesh_predictions, cmap = light_colors)
    pyplot.scatter(train_data[:, 0], train_data[:, 1], c = train_labels, s = 100, cmap = cc
    pyplot.title('Train data, accuracy={:.2f}'.format(metrics.accuracy_score(train_labels,

    pyplot.subplot(1,2,2)
    pyplot.pcolormesh(xx, yy, mesh_predictions, cmap = light_colors)
    pyplot.scatter(test_data[:, 0], test_data[:, 1], c = test_labels, s = 100, cmap = color
    pyplot.title('Test data, accuracy={:.2f}'.format(metrics.accuracy_score(test_labels, es
```

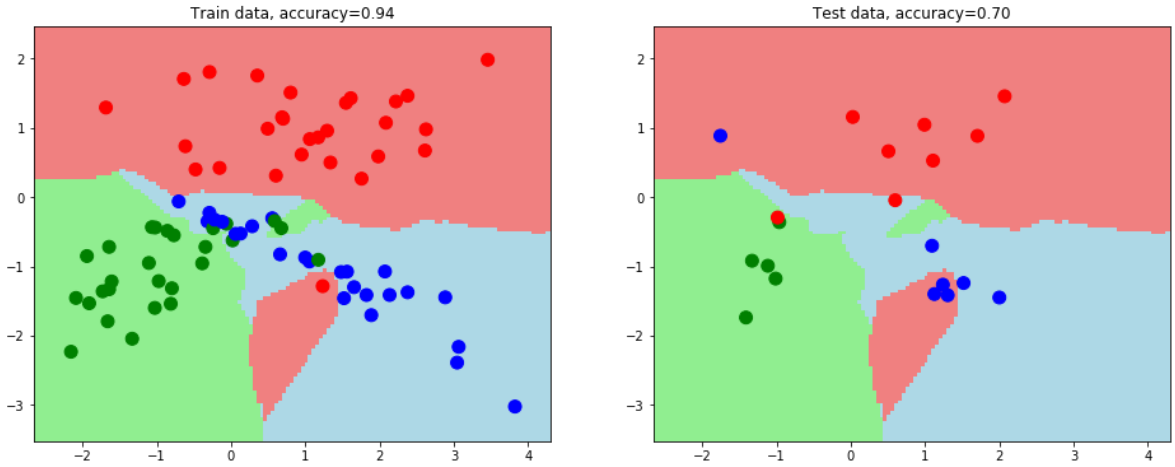
In [4]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=1)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



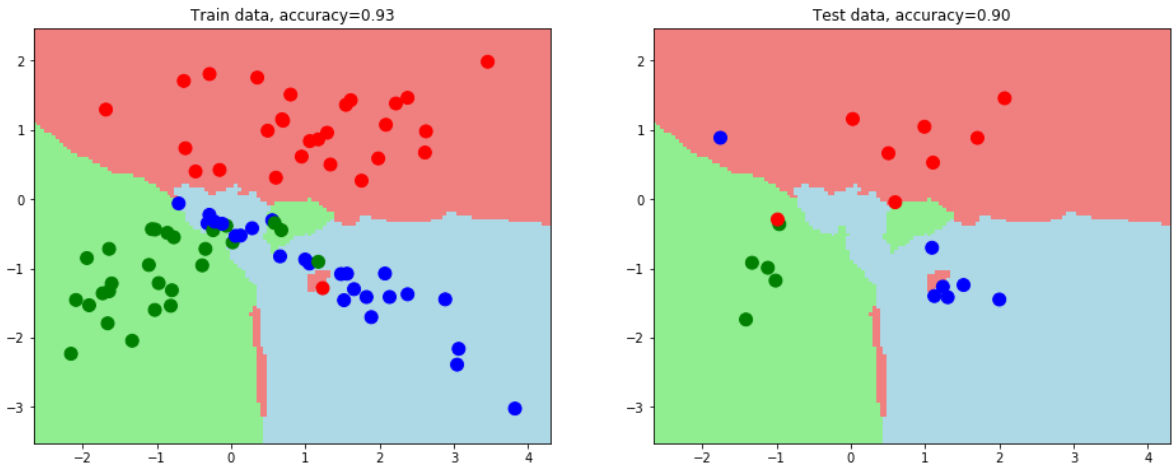
In [5]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=2)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



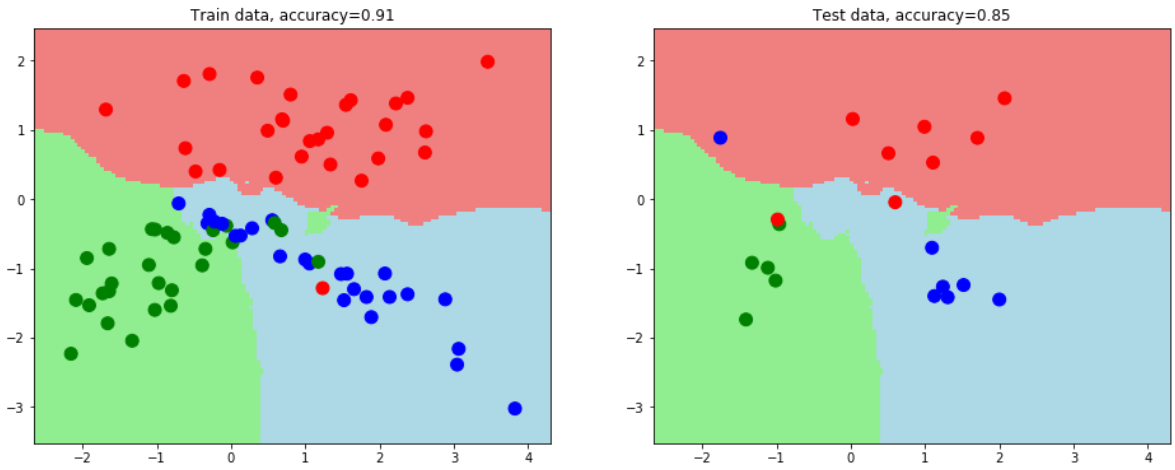
In [6]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=3)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



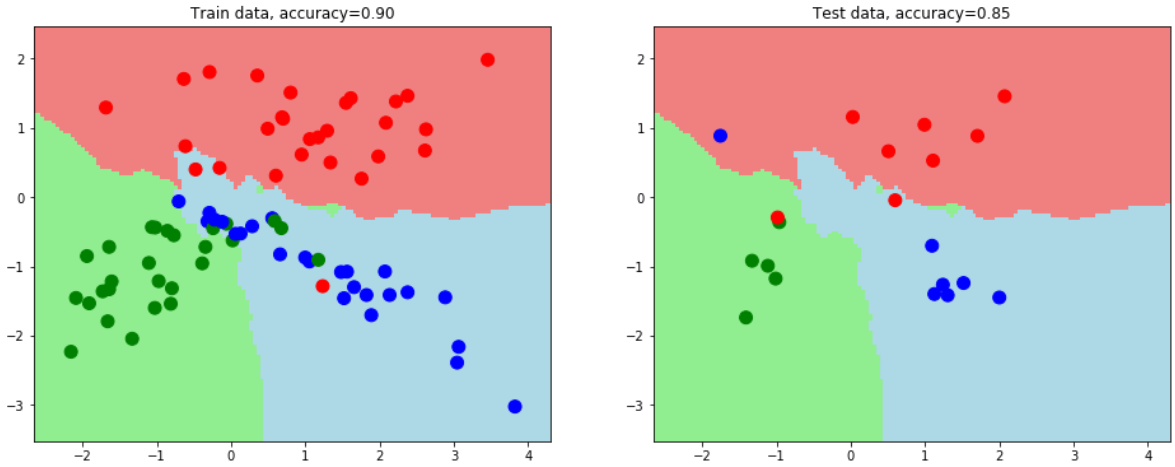
In [7]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=5)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



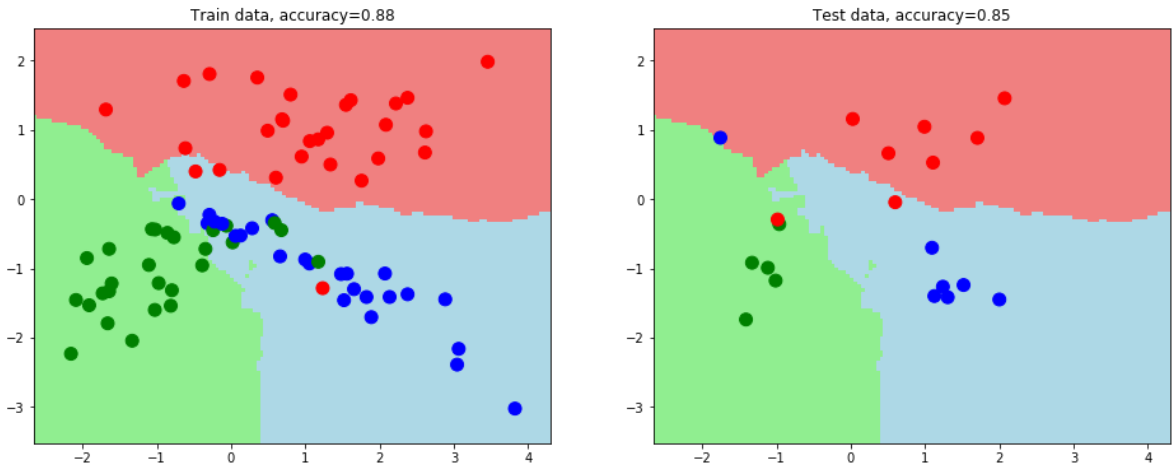
In [8]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=7)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



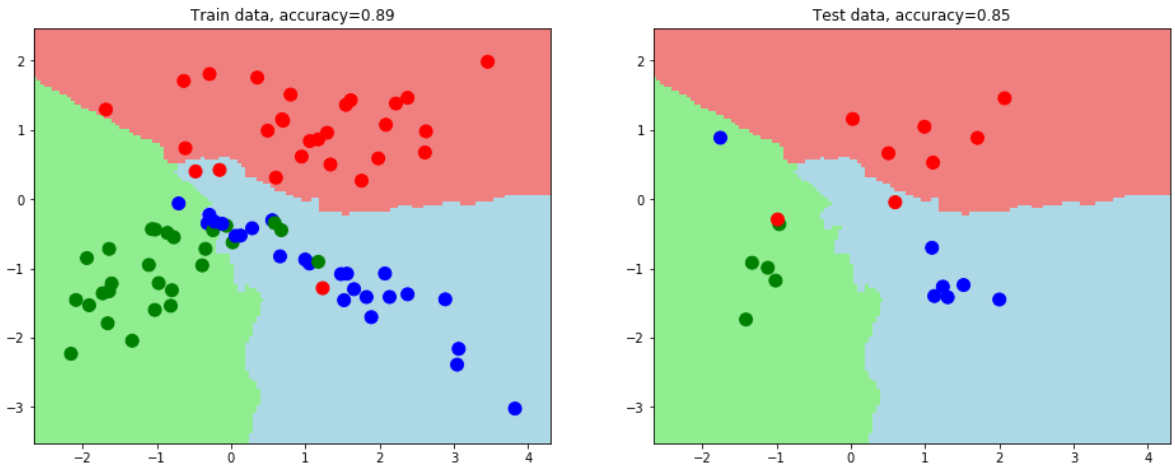
In [9]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=10)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



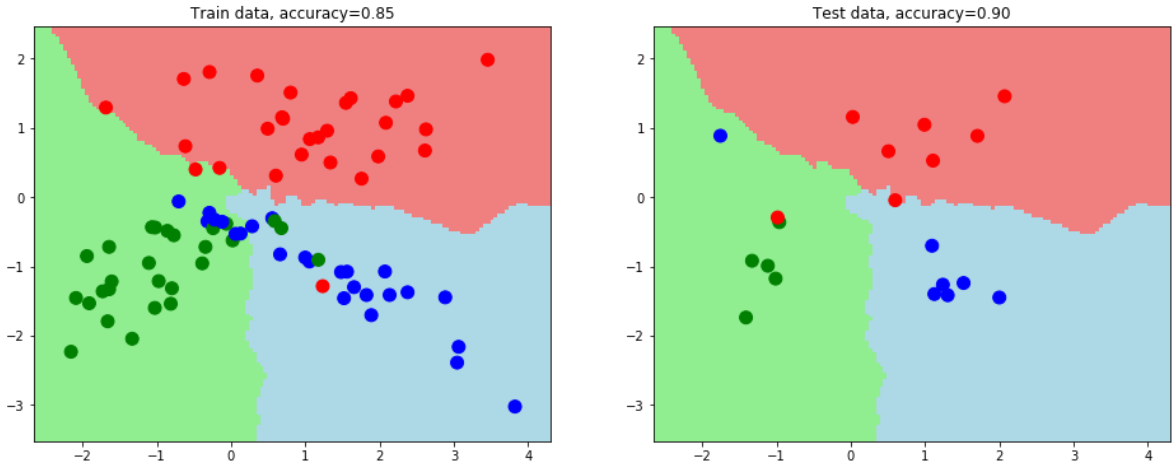
In [10]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=20)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```



In [11]:

```
estimator = neighbors.KNeighborsClassifier(n_neighbors=30)
plot_decision_surface(estimator, train_data, train_labels, test_data, test_labels)
```

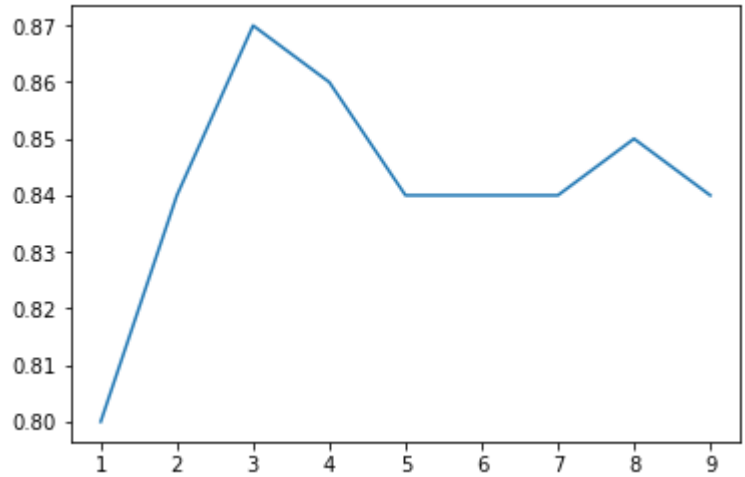


In [12]:

```
range_ = range(1, 10, 1)
accuracies = []
kf = KFold(n_splits = 5)
for k in range_:
    sum_ = 0
    clf = neighbors.KNeighborsClassifier(n_neighbors = k)
    for train_indices, test_indices in kf.split([j for j in range(0,100)]):
        train_data = [classification_problem[0][i] for i in train_indices]
        test_data = [classification_problem[0][i] for i in test_indices]
        train_labels = [classification_problem[1][i] for i in train_indices]
        test_labels = [classification_problem[1][i] for i in test_indices]
        clf.fit(train_data, train_labels)
        sum_ += metrics.accuracy_score(test_labels, clf.predict(test_data)) / 5.0
    accuracies.append(sum_)

pyplot.plot(range_, accuracies)
#График точности классификация в зависимости от числа соседей K
```

Out[12]:

```
[<matplotlib.lines.Line2D at 0xaf2f208>]
```



Таким образом, видим, что k = 3 - наилучшее по точности