In [ ]:

```python
import matplotlib.pyplot as plt

from sklearn import datasets, svm
from sklearn.model_selection import train_test_split
from sklearn.inspection import DecisionBoundaryDisplay
from sklearn.metrics import accuracy_score
```

In [ ]:

```python
iris = datasets.load_iris()
# Take the first two features. We could avoid this by using a two-dim dataset
X = iris.data[:, :2]
y = iris.target
```

In [ ]:

```python
C = 1.0  # SVM regularization parameter
models = (
    svm.SVC(kernel="linear", C=C),
    svm.LinearSVC(C=C, max_iter=10000, dual="auto"),
    svm.SVC(kernel="rbf", gamma=0.7, C=C),
    svm.SVC(kernel="poly", degree=3, gamma="auto", C=C),
)
models = (clf.fit(X, y) for clf in models)
```

In [ ]:

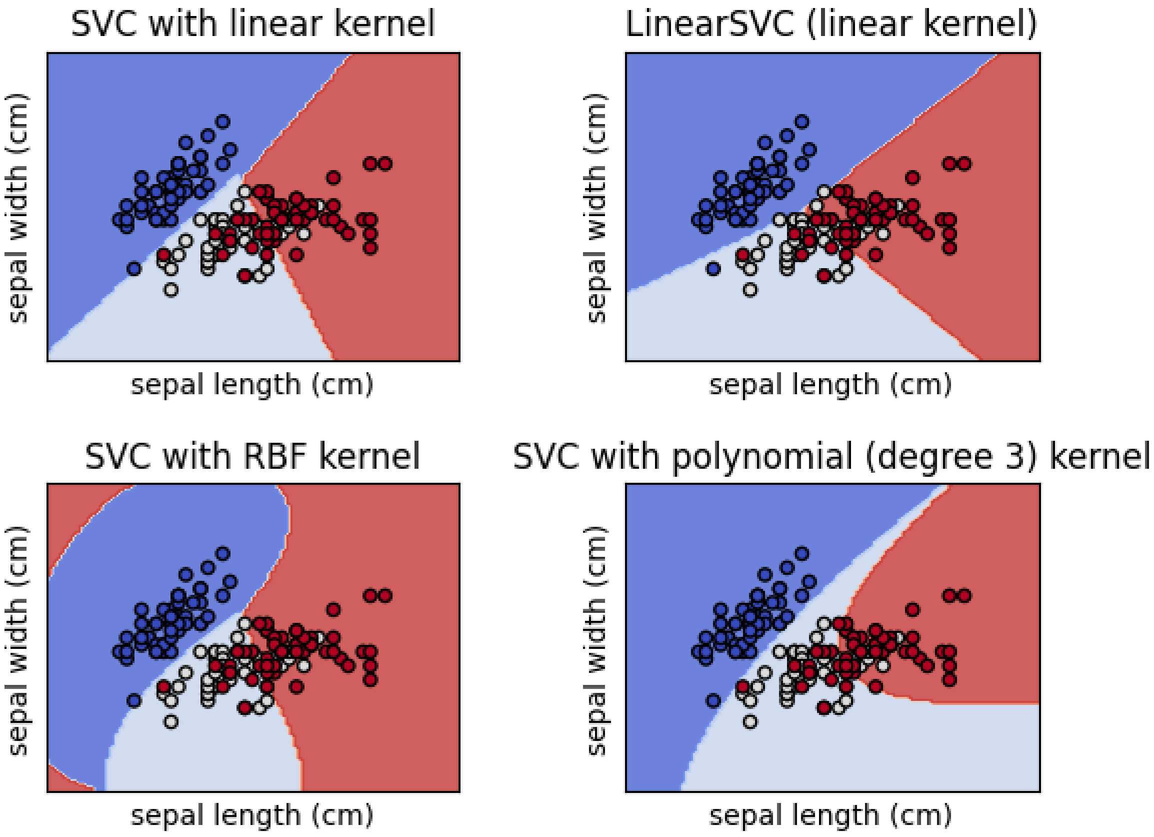
```python
# title for the plots
titles = (
    "SVC with linear kernel",
    "LinearSVC (linear kernel)",
    "SVC with RBF kernel",
    "SVC with polynomial (degree 3) kernel",
)

# Set-up 2x2 grid for plotting.
fig, sub = plt.subplots(2, 2)
plt.subplots_adjust(wspace=0.4, hspace=0.4)

X0, X1 = X[:, 0], X[:, 1]

for clf, title, ax in zip(models, titles, sub.flatten()):
    disp = DecisionBoundaryDisplay.from_estimator(
        clf,
        X,
        response_method="predict",
        cmap=plt.cm.coolwarm,
        alpha=0.8,
        ax=ax,
        xlabel=iris.feature_names[0],
        ylabel=iris.feature_names[1],
    )
    ax.scatter(X0, X1, c=y, cmap=plt.cm.coolwarm, s=20, edgecolors="k")
    ax.set_xticks(())
    ax.set_yticks(())
    ax.set_title(title)

plt.show()
```



SVC with linear kernel

LinearSVC (linear kernel)

SVC with RBF kernel

SVC with polynomial (degree 3) kernel

In [ ]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

In [ ]:

```
models = (
    svm.SVC(kernel="linear", C=C),
    svm.LinearSVC(C=C, max_iter=10000, dual="auto"),
    svm.SVC(kernel="rbf", gamma=0.7, C=C),
    svm.SVC(kernel="poly", degree=3, gamma="auto", C=C),
)
```

In [ ]:

```
accuracies = []
for model, title in zip(models, titles):
    model.fit(X_train, y_train)
    y_pred = model.predict(X_test)
    accuracy = accuracy_score(y_test, y_pred)
    accuracies.append(accuracy)
    print(f"{title} Accuracy: {accuracy:.2f}")
```

```
SVC with linear kernel Accuracy: 0.90
LinearSVC (linear kernel) Accuracy: 0.93
SVC with RBF kernel Accuracy: 0.90
SVC with polynomial (degree 3) kernel Accuracy: 0.80
```

In [ ]: