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```
[ ]
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import svm
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix, classification_report
sns.set(style="whitegrid", font_scale=1.2)
data = {
    'Type': ['Muffin', 'Muffin', 'Muffin', 'Muffin', 'Muffin',
             'Cupcake', 'Cupcake', 'Cupcake', 'Cupcake', 'Cupcake'],
    'Flour': [55, 54, 53, 52, 56, 40, 41, 42, 39, 43],
    'Sugar': [12, 10.5, 11, 9.5, 13, 20, 22, 19, 23, 21]
}
recipes = pd.DataFrame(data)
print("✅ Dataset Created Successfully!")
print(recipes, "\n")
X = recipes[['Sugar', 'Flour']].values
y = np.where(recipes['Type'] == 'Muffin', 0, 1)
model = svm.SVC(kernel='linear')
model.fit(X, y)
w = model.coef_[0]
a = -w[0] / w[1]
xx = np.linspace(min(X[:, 0]) - 1, max(X[:, 0]) + 1)
yy = a * xx - (model.intercept_[0]) / w[1]
support_vectors = model.support_vectors_
yy_down = a * xx + (support_vectors[0][1] - a * support_vectors[0][0])
yy_up = a * xx + (support_vectors[-1][1] - a * support_vectors[-1][0])
sns.lmplot(x='Sugar', y='Flour', data=recipes, hue='Type', palette='Set1', fit_reg=False, scatter_kws={"s": 70})
plt.plot(xx, yy, 'k-', linewidth=2)
plt.plot(xx, yy_down, 'k--')
plt.plot(xx, yy_up, 'k--')
```

Variables Terminal

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```
yy = a * xx - (model.intercept_[0]) / w[1]
support_vectors = model.support_vectors_
yy_down = a * xx + (support_vectors[0][1] - a * support_vectors[0][0])
yy_up = a * xx + (support_vectors[-1][1] - a * support_vectors[-1][0])
sns.lmplot(x='Sugar', y='Flour', data=recipes, hue='Type', palette='Set1', fit_reg=False, scatter_kws={"s": 70})
plt.plot(xx, yy, 'k-', linewidth=2)
plt.plot(xx, yy_down, 'k--')
plt.plot(xx, yy_up, 'k--')
plt.scatter(model.support_vectors_[:, 0], model.support_vectors_[:, 1], s=80, facecolors='none', edgecolors='k')
plt.title("SVM Decision Boundary for Muffins vs Cupcakes")
plt.show()
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)
model2 = svm.SVC(kernel='linear')
model2.fit(X_train, y_train)
pred = model2.predict(X_test)
print("Predictions:", pred)
print("\nConfusion Matrix:\n", confusion_matrix(y_test, pred))
print("\nClassification Report:\n", classification_report(y_test, pred))
print("✅ Execution Completed Successfully!")
```

```
✅ Dataset Created Successfully!
      Type  Flour  Sugar
0   Muffin     55   12.0
1   Muffin     54   10.5
2   Muffin     53   11.0
3   Muffin     52    9.5
4   Muffin     56   13.0
5  Cupcake     40   20.0
6  Cupcake     41   22.0
7  Cupcake     42   19.0
8  Cupcake     39   23.0
9  Cupcake     43   21.0
```

Variables Terminal

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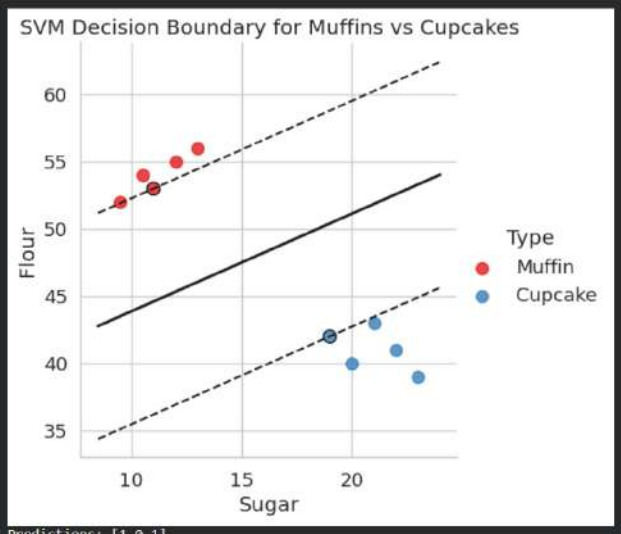
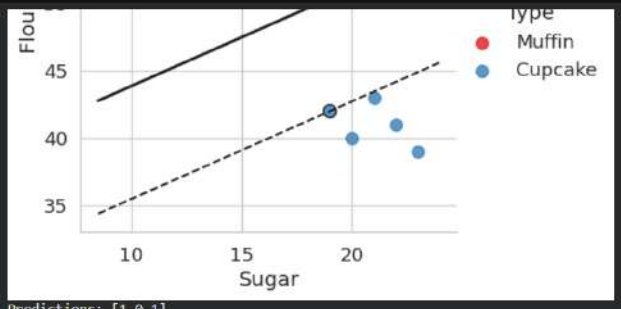



```
Predictions: [1 0 1]

Confusion Matrix:
 [[1 0]
 [0 2]]
```




```
Predictions: [1 0 1]

Confusion Matrix:
 [[1 0]
 [0 2]]

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         1
           1       1.00      1.00      1.00         2

    accuracy                           1.00         3
   macro avg       1.00      1.00      1.00         3
weighted avg       1.00      1.00      1.00         3

✅ Execution Completed Successfully!
```

```
from sklearn.datasets import load_iris
```