

```
... question1.py X ... question1.py > ...
1 # Import libraries
2 from sklearn.datasets import load_iris
3 from sklearn.model_selection import train_test_split
4 from sklearn.ensemble import RandomForestClassifier
5 from sklearn.metrics import accuracy_score
6
7 # Load dataset
8 iris = load_iris()
9 X = iris.data
10 y = iris.target
11
12 # Split into training (70%) and testing (30%)
13 X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)
14
15 # Train the Random Forest Classifier
16 rf_model = RandomForestClassifier(n_estimators=100, random_state=42)
17 rf_model.fit(X_train, y_train)
18
19 # Predict on test data
20 y_pred = rf_model.predict(X_test)
21
22 # Calculate accuracy
23 accuracy = accuracy_score(y_test, y_pred)
24 print("Model Accuracy:", accuracy)
25
```

OUTPUT DEBUG CONSOLE TERMINAL PORTS Python Debug Console + ×

- PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4> & 'c:\Users\zumer\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\zumer\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '55676' '--' 'c:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4\question1.py'
Model Accuracy: 1.0
- PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4>

```
question2.py X question2.py > ...  
1 # Import libraries  
2 from sklearn.datasets import load_breast_cancer  
3 from sklearn.model_selection import train_test_split  
4 from sklearn.svm import SVC  
5 from sklearn.metrics import accuracy_score, confusion_matrix  
6  
7 # Load dataset  
8 data = load_breast_cancer()  
9 X = data.data  
10 y = data.target  
11  
12 # Split data  
13 (function) def print(  
14     *values: object,  
15     sep: str | None = " ",  
16     end: str | None = "\n",  
17     file: SupportsWrite[str] | None = None,  
18     flush: Literal[False] = False  
19 ) -> None  
20 Prints the values to a stream, or to sys.stdout by default.  
21  
22 sep  
23 string inserted between values, default a space.  
24 end  
25 string appended after the last value, default a newline.  
26 print("Accuracy:", acc)  
27 print("Confusion Matrix:\n", cm)  
28
```

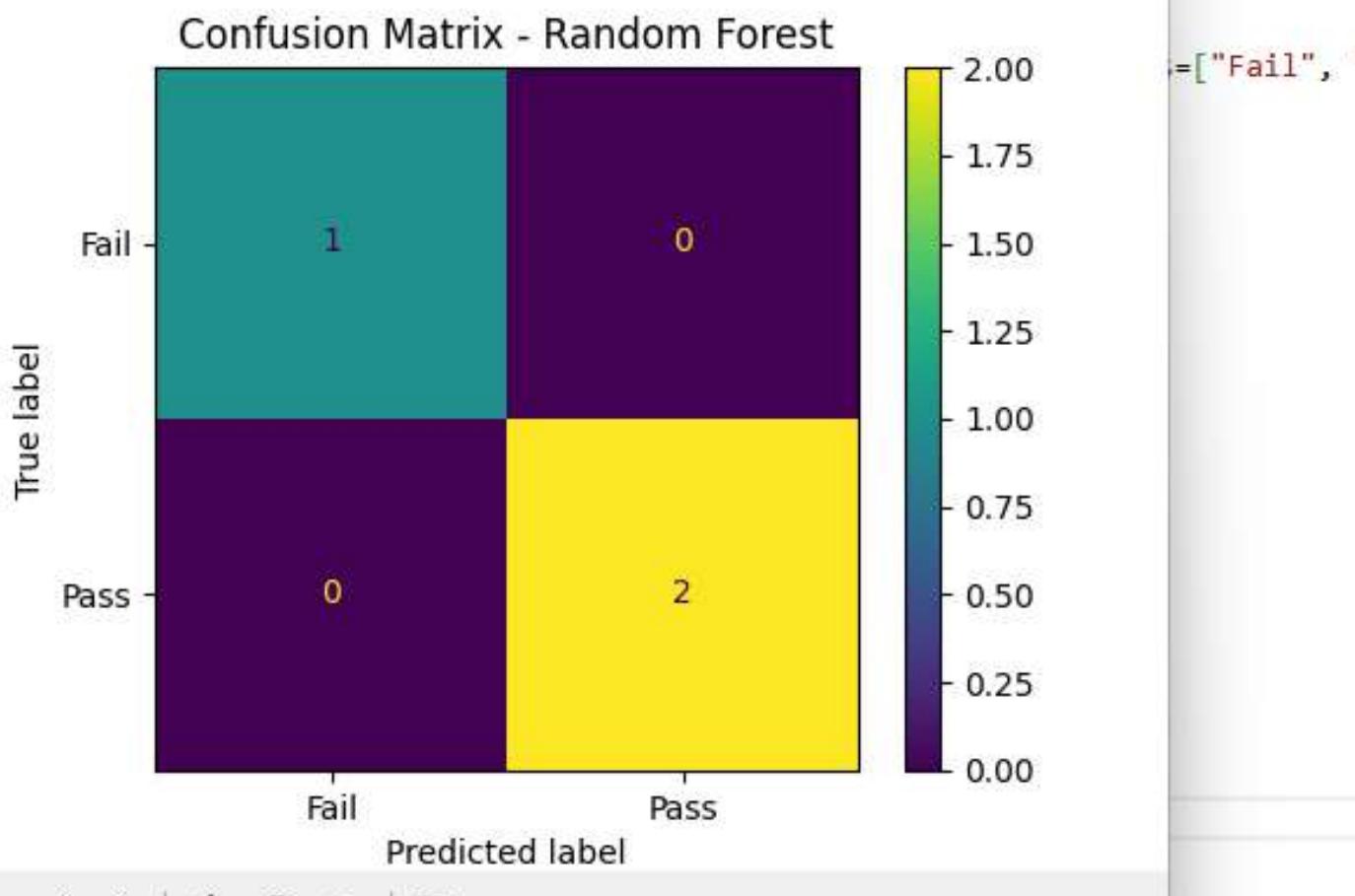
OUTPUT DEBUG CONSOLE TERMINAL PORTS Python Debug Console + × ⌂ ⌂ ⌂ ⌂ ⌂ ⌂

- PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4> c;; cd 'c:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4'; & 'c:\Users\zumer\AppData\Local\Programs\Python\Python313\python.exe' 'c:\Users\zumer\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '57383' '--' 'c:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4\question2.py'
Accuracy: 0.956140350877193
Confusion Matrix:
[[39 4]
 [1 70]]
- PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4>

question3.py X students.csv



```
question3.py > ...
48     print(f'{feature}: {importance:.3f}')
49
50
51 Figure 1
```



OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4> & 'c:\Users\zumer\AppData\Local\Programs\zumer\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\lau
b working\lab 4\Assignment 4\question3.py'
```

Feature Importance:

study_hours: 0.352

attendance: 0.363

marks: 0.286

Help ← → Assignment 4

question3.py question4.py ×

question4.py > ...

```
28 # -----
29 # Step 1: Load the data
30 # -----
31 y_pred = np.argmax(model.predict(X), axis=1)
32 accuracy = np.mean(y_pred == y)
33 print(f'Accuracy: {accuracy:.2f}')
34
35 # -----
36 # Step 2: Visualize misclassified digits
37 # -----
38 misclassified_digits = X[y != y_pred]
39
40 plt.figure(figsize=(10, 8))
41 plt.title('Misclassified Digits (True vs Predicted)')
42 for i, digit in enumerate(misclassified_digits):
43     plt.subplot(2, 4, i + 1)
44     plt.imshow(digit, cmap='gray')
45     plt.title(f'T:{y[i]} P:{y_pred[i]}')
46
47 plt.tight_layout()
48 plt.show()
49
50 plt.savefig('misclassified_digits.png')
51 plt.close()
```

Figure 1

Misclassified Digits (True vs Predicted)

T:8 P:9 T:7 P:9 T:9 P:7 T:9 P:8

T:5 P:6 T:3 P:8 T:9 P:3

(x, y) = (1.10, 4.68)
[2.00]

OUTPUT DEBUG CONSOLE TERMINAL PORTS

PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4> & 'c:\Users\zumer\AppData\Local\Programs\Python\zumer\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher' '59541' '--' 'c:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4\question3.py'

PASS

PS C:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4> c;; cd 'c:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4'; python 'c:\Users\zumer\.vscode\extensions\ms-python.debugpy\libs\debugpy\launcher' '54626' '--' 'c:\Users\zumer\OneDrive\Desktop\lab working\lab 4\Assignment 4\question4.py'

Accuracy: 0.987037037037037

```
? :\\Users\\zumer\\AppData\\Local\\Programs\\Python\\Python313\\python.exe' 'c:\\Users\\zumer\\.vscode\\extensions\\ms-python.debugpy-2025.18.0-win32-x64\\bundle\\libs\\debugpy\\launcher' '54626' '--' 'c:\\Users\\zumer\\OneDrive\\Desktop\\lab working\\lab 4\\Assignment 4\\question4.py' ...
● PS C:\\Users\\zumer\\OneDrive\\Desktop\\lab working\\lab 4\\Assignment 4> c:\\Users\\zumer\\OneDrive\\Desktop\\lab working\\lab 4\\Assignment 4'; & 'c:\\Users\\zumer\\AppData\\Local\\Programs\\Python\\Python313\\python.exe' 'c:\\Users\\zumer\\.vscode\\extensions\\ms-python.debugpy-2025.18.0-win32-x64\\bundle\\libs\\debugpy\\launcher' '51019' '--' 'c:\\Users\\zumer\\OneDrive\\Desktop\\lab working\\lab 4\\Assignment 4\\question5.py'
Random Forest Accuracy: 1.0
SVM Accuracy: 0.7592592592593
 Random Forest performs better.
○ PS C:\\Users\\zumer\\OneDrive\\Desktop\\lab working\\lab 4\\Assignment 4>
```