Confusion Matrix Exercise

1. **Topic: Medical Diagnosis**

Consider a diagnostic test for cancer disease. In a sample of 500 people, 400 do not have the disease. The test correctly identifies 350 healthy people but also wrongly diagnoses 50 healthy people as having the disease. Of the remaining 100 people who actually have the disease, the test correctly diagnoses 90.

Questions: Draw a confusion matrix table. What is the precision of the diagnostic test? What is the recall of the diagnostic test? What is the F1 score for this diagnostic test? What is the accuracy of the model?

2. **Topic: Sentiment Analysis**

Suppose a machine learning model has been trained to perform sentiment analysis on a dataset of 1000 movie reviews. It classified 400 reviews as positive, and upon manual checking, it was found that it correctly identified 300 reviews. The model identified 600 reviews as negative, but there were actually 550 negative reviews in the dataset.

Questions: Draw a confusion matrix table. What is the precision of the sentiment analysis model? What is the recall of the sentiment analysis model? What is the F1 score for this sentiment analysis model? What is the accuracy of the model?

3. **Topic: Image Classification**

An AI system has been developed to identify cats in images. The system was tested on a dataset of 1000 images and it classified 600 images as containing a cat. Out of these 600 images, 450 images actually contained a cat. Out of the remaining 400 images, 50 images were incorrectly classified as not containing cats.

Questions: Draw confusion matrix table. What is the precision of the image classification system? What is the recall of the image classification system? What is the F1 score for this image classification system? What is the accuracy of the model?

4. **Topic: Spam Detection**

Suppose you have a spam detection system for emails. In a testing dataset, there are 1000 emails. The system flagged 250 emails as spam, but only 150 of them were actually spam. The system flagged 750 emails as good emails, but there are 50 emails among them are actually spam.

Questions: Draw confusion matrix table. What is the precision of the spam detection system? What is the recall of the spam detection system? What is the F1 score for this spam detection system? What is the accuracy of the model?