

**MA477: Data Science**  
**Lesson 11 Board Sheet — 04 February 2026**  
 United States Military Academy, West Point  
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## 1 Classification Lesson Objectives

- Understand common performance measures used in classification to include accuracy, precision, recall, and  $F_1$  score.
- Use a receiver operating characteristic (ROC) curve to assess classifiers.
- Understand the difference between multiclass and multioutput classification.

### Discussion Questions

We will organize this lecture around the following five questions:

1. Give an example of a scenario where high precision is appropriate.
2. Give an example of a scenario where high recall is appropriate.
3. Describe an example of a multiclass problem?
4. Describe an example of a multilabel problem?
5. Why do we need an objective function to train a classifier, and how should it relate to probability / threshold?
6. How are the quantities we optimize during training connected to the metrics we use to evaluate a model afterward?

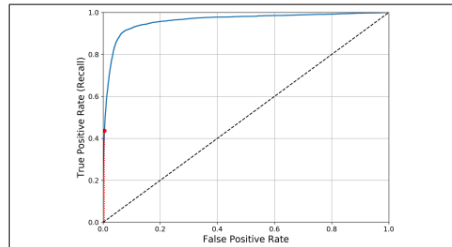


Figure 3-6. ROC curve

Figure 1

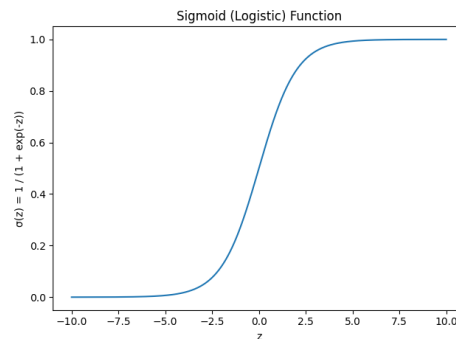


Figure 2